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LIFE AND WORKS OF GIUSEPPANGELO FONZI

DR. VINCENZO GUERINI

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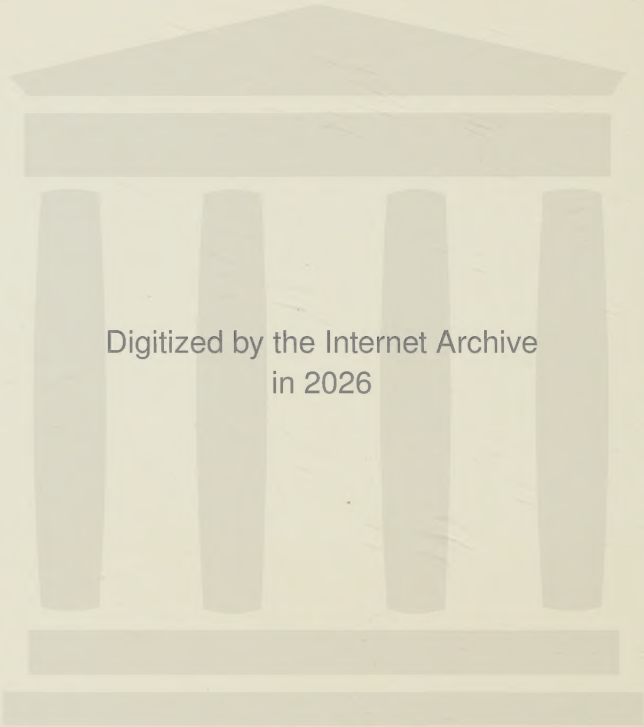

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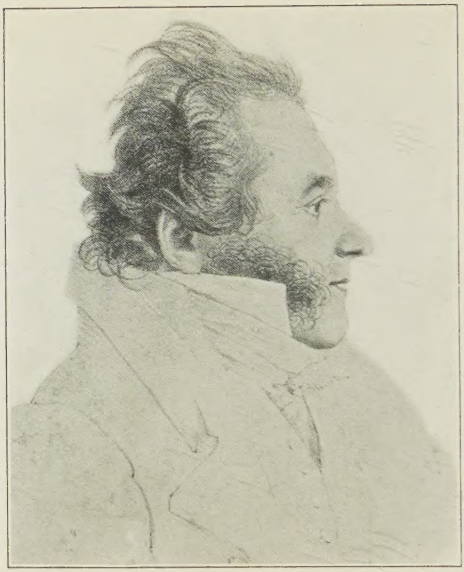

Giuseppangelo Fonzi,
Artist, Scientist, Dentist.

From a black and white sketch appearing in one of his books

THE LIFE AND WORKS

OF

GIUSEPPANGELO FONZI

BY

DR. VINCENZO GUERINI

SURGEON-DENTIST, NAPLES, ITALY; DENTIST BY APPOINTMENT TO THE ROYAL HOUSE; DENTIST OF THE SURGICAL CLINIC OF THE UNIVERSITY OF NAPLES; AUTHOR OF MANY ODONTOLOGICAL WORKS; HONORARY PRESIDENT OF THE ITALIAN ODONTOLOGICAL FEDERATION; MEMBER OF THE ITALIAN SOCIETY OF SCIENTISTS, LITERARY MEN, AND ARTISTS; COMM. OF THE ORDER OF THE CROWN OF ITALY; OFFICER OF THE ORDER OF SS. MAURIZIO E LAZZARO.

DOCTOR OF DENTAL SURGERY AD HONOREM OF THE CHICAGO COLLEGE OF DENTAL SURGERY; VICE-PRESIDENT OF THE EXECUTIVE COUNCIL OF THE INTERNATIONAL DENTAL FEDERATION; MEMBER OF MANY ODONTOLOGICAL SOCIETIES; OFFICER OF PUBLIC INSTRUCTION OF THE FRENCH REPUBLIC; KNIGHT FIRST CLASS OF THE ORDER OF ALBERT OF SAXONY, ETC.

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PREFACE.

It not unfrequently happens that from adverse circumstances or through the arts of malevolent individuals, the authors of conspicuous works or of inventions of the greatest utility to humanity disappear from this world's scene without having obtained the fame or the reward to which their labors entitle them; a long period of time often elapses before posterity renders justice and honor to the merits of these workers.

History registers many such cases, among which the best known to the dental world is no doubt that of Horace Wells, the unfortunate inventor of surgical anesthesia, driven to a tragic end by the grief of seeing his discovery unacknowledged, and only too late exalted and glorified as one of the greatest benefactors of humanity.

These tardy recognitions are certainly not altogether vain; they satisfy the search for truth and justice constantly demanded by the human mind, when not blinded by envy or other evil passions. Hence it is that I have endeavored to rescue from oblivion the eminent personality of Giuseppangelo Fonzi, until now almost entirely unknown.

I have already had occasion to refer to this illustrious dentist in other writings, first of all in a paper[1] read before the International Dental Congress of St. Louis, 1904, and later in my *History of Dentistry*.

At that time, however, the documents at my disposal were too scarce and quite insufficient, and I waited for an occasion of obtaining others that might enable me to throw full light on the genial personality of the man and on his important discoveries.

My hope was finally realized through the singular circumstances that I shall now relate.

It happened about fourteen years ago that a young Italian physician, Dr. Raffaele Melocchi, a native of Abruzzo, while studying dentistry in Philadelphia, heard Fonzi's discovery of mineral teeth mentioned by his professor of dental prosthesis. Dr. Melocchi then remembered that his father-in-law, the land surveyor, Thomas Verri, also a native of Abruzzo, but at that time residing in Philadelphia, had often spoken to him of the celebrated dentist Fonzi, who was an uncle of his.

Dr. Melocchi, on visiting his father-in-law, shortly afterward obtained from him some information about Fonzi and his descendants, which he communicated to Dr. Kirk, then Dean of the Dental Faculty of the University of Pennsylvania.

[1] The Italian Writers on Dentistry and Their Works.

My friend Dr. Kirk, knowing that I had already occupied myself with the history of Fonzi in various writings of mine, thought it proper, on account of my well-known interest in the history of dentistry, to transmit to me certain information he had gotten from Dr. Melocchi; for which I was very grateful to him, and am now happy to here express to him my most cordial thanks.

In this manner it came to my knowledge that there still lived at Orsogna, in the Province of Chieti, descendants of the family to which Fonzi belonged, and I also learned that one of them, an advocate, viz, Francesco Fonzi, was in possession of writings, documents and many objects that had belonged to his illustrous ancestor.

My delight on receiving this intelligence may easily be imagined; as soon as was possible, after a brief correspondence with Signor Francesco Fonzi, I went to Orsogna, where I was most courteously received. Signor Francesco Fonzi not only showed me the collection of writings and objects carefully conserved by the family, but also most kindly consented to entrust them to me and permitted me to take them with me. It is from these original sources that I am enabled to give form and permanence to the character and work of one of the heretofore overlooked benefactors of the dental art.

LIFE AND WORKS
OF
GIUSEPPANGELO FONZI

Giuseppangelo Fonzi was born on July 13, 1768, at Spoltore in the province of Teramo. His father, Domenico Fonzi, was a lawyer by profession, and acted as agent to the Prince Colonna of Rome; his mother's name was Marianna Laudadio. They resided ordinarily in Orsogna, and it was there that Giuseppangelo grew up. From his infancy he gave evidence of extraordinary intelligence: He had only just attained his sixteenth year when he successfully completed his scholastic studies and began to study law in the town of Chieti, where he soon won the admiration and sympathy of all his professors by the vivacity of his intelligence and by his rapid progress.

But the narrow sphere of life in a provincial town soon became intolerable to the youth, so that he entreated his father to send him to Naples to continue his studies; but he was told that this was not possible for the present, as the family

means did not permit further expenditure, one of his brothers being already at the University in Naples and two others in the seminary of their native town. His father therefore advised him to wait until the eldest of his brothers had finished his studies. But the ardor and impatience of the young man could brook no such delay, and so it was that on returning home for the vacation he suddenly left the paternal roof, taking with him merely a silver fork, spoon and knife, by the sale of which to provide for his first and most pressing necessities, and trusting for the rest to the resources of his intelligence.

He went to Rome, presented himself to the Prince Colonna as the son of his agent, and by his manners and mode of expressing himself made so favorable an impression on the Prince that he consented to provide him with pecuniary means and letters of recommendation to various persons in Naples.

On the journey he chanced to meet with a celebrated poetic extemporizer of those times, Signor Antonio Natale, with whom he promptly sympathized and made friends, without doubt because Fonzi was himself a poet born, of which he later on gave brilliant proof. They accordingly traveled together to Naples, and there Natale gained great admiration by the marvellous facility with which he treated in extemporized verses the subjects proposed to him in public reunions.

We have mentioned this meeting of Fonzi with Natale and the friendship that arose between the two, because this fact undoubtedly increased in young Fonzi's mind the love for poetry that was one of the principal characteristics of his life.

But though this love was very strong in him, still stronger was his desire to see and learn things that to him were new. After a brief stay in Naples he embarked on a Spanish man-of-war, which afforded him the advantage of learning the Spanish language and also of learning astronomy and nautical science. In this study he was particularly favored by the commander of the vessel, an intelligent and cultivated man who, appreciating the young man's noble sentiments and brilliant talent, showed great affection for him. Fonzi wrote at that time some lyrical poems in praise of his protector, and others in praise of a very beautiful little kid that was on board the ship, and to which the commander was very affectionate. By this means young Fonzi gained still more his benevolence. These poems were written in Italian, but this language was quite familiar to the commander.

On board the ship a young pilot being required for the special care of the compass, Fonzi submitted himself with other young men to a competitive examination and gained the post.

On a return voyage from Constantinople he profited by the brief stay in Syracuse to send the

following verse to his father who for some years was without news of him.

Padre,
Io vivo: favorevole
Fortuna è al viver mio;
Tu pria che scendi al tumulo,
Vedrai tuo figlio, Addio.[1]

In fact, his life at that time ran quite smoothly, thanks to the benevolence of the commander of the vessel who had a paternal affection for him and often sought his company. He therefore enjoyed a privileged position.

But things were soon to change; his protector was called to another post and was succeeded in command of the vessel by a man of an altogether different character—rough in manner and hard-hearted—who exacted with excessive rigor from all his dependants the strictest observance of duty.

Fonzi's life then became very hard, for he found himself deprived of the liberty that his nature so particularly required, and besides, with no other company than a vulgar and ignorant ship's crew with whom he was obliged to be in continual contact, without the possibility of exchanging ideas with well-bred and cultivated persons.

He could not long endure this kind of life; so while the ship was anchored in a Spanish port he abandoned his post.

[1] Father! I live; fortune favors my existence. Thou wilt see thy son before thou goest down to the tomb. Addio.

At first his life was then very difficult for he was without means and without acquaintance. However he did not lose heart. Thanks to his rare abilities and his resourceful intelligence he always found the way of providing for his daily necessities.

In truth, we know but little about this period of his life. Very probably, not yet having a fixed profession and finding himself, besides, a stranger in a foreign land, he may have lived for the time being a life of adventure, doing now one thing and now another to gain his bread, but ever keeping in view the firm purpose of finding sooner or later an outlet that should lead to a better future.

From a biographical sketch on Fonzi, written in 1873 by his nephew Francesco, we learn that before going to France, where as we shall see he passed the greater part of his life, he resided several years in Spain.

It was precisely at this period that he began to occupy himself with dentistry. It happened one day that he stopped in a square to look at a tooth-puller who, by extracting teeth and selling cosmetics, made much money. He thought that he would be able to do as much and still better, for he was sure of possessing a more easy and convincing speech than that man, and also of being far better instructed than he. For several days he attentively observed all that the tooth-puller did and all the instruments he employed. After

this curious apprenticeship he procured the few instruments then necessary to a tooth-puller, and began immediately to practise this calling in the public squares.

But that kind of life was most painful to him, being in direct conflict with his proud nature and elevated sentiments. He, therefore, with the aid of the few books on dentistry he was able to procure, sought to learn all that was then known concerning dental maladies and their treatment, and soon became an able and cultured dentist, esteemed by all who knew him —one whose intelligent work and dignified manners soon placed him in a position to gain more than he needed for his maintenance. By his talent, his ability, his amiable character and his liberality, he acquired many acquaintances and friendships that would have ensured him a splendid future, even had he remained in Spain.

But his restless spirit and his intense desire to rise to the highest rank in his profession induced him to abandon Spain for Paris, the city in which the dental art had already flourished for some time, owing especially to the labors of Fauchard and his successors.

At Paris, where he established himself about the year 1795, he set up a dental office and soon acquired many clients. But he did not limit himself merely to the practice of the dental art; he studied continually, and his great predisposition for chemi-

Fonzi at Thirty-three Years.

Living in Paris at this time and the hair dressed in the mode of the day. From a black and white drawing.

cal and physical studies afterward proved of signal use to him in carrying out his inventions.

In 1801, desiring to again see his family, he left his cabinet and annexed dental laboratory in the charge of a trustworthy person and returned to Italy. He remained with his relatives at Orsogna for a short time and then went to Naples, where he determined to take up his residence and exercise his profession. He made a successful beginning, acquiring friends and acquaintance among influential persons, and soon gaining credit by his ability, he was named dentist to the King and Queen of Naples. But shortly after he found himself obliged to leave this capital in order to withdraw from the embarrassing position in which he was placed by a proposal made to him by the Queen Maria Carolina. By his prepossessing appearance, to which his brilliant conversational gifts and vast culture added still greater attraction, Fonzi was a welcome guest in the families of the Neapolitan aristocracy. The Queen Maria Carolina now proposed to him, offering ample compensation for such service, to become informer as to the sentiments and actions of these noble families with regard to the Court. A man of Fonzi's honest principles and sense of personal dignity could not adapt himself to the idea of becoming a political spy, but at the same time a flat refusal would have exposed him to some terrible revenge, or even imperilled his life, for

Maria Carolina's imperious and malignant character was only too well known. How could he escape from so terrible a dilemma? There was but one way—to leave the city and abandon the kingdom of Naples immediately. He therefore returned to Paris, where he resumed his profession and his researches that tended especially to perfecting the manufacture of mineral teeth and the mode of applying them.

In the latter part of this book we shall speak of these researches and of their admirable results; here we will continue our biographical recital.

For several years Fonzi had as companion of his life a most intelligent woman, by name Hèlène de Clècy. He had not married her, but loved her so much that he had led his family and all his acquaintance to believe that she was really his wife. In a letter written by him from Paris to his sister, Pippa, dated December 2, 1808, among other things he tells her that he has married a good and most sensible young woman who takes great care of his interests, and whose love compensates him for the disappointment of not having children.

Among Fonzi's letters we also find some written by the De Clècy; one of these is addressed to Fonzi's brother, Orante, and seems to us worthy of being here reproduced.[1]

[1] For the English translation of this letter, see page 134.

Paris, 22 dècembre, 1811.

"Orante, cher Orante,

"Voulez-vous, pouvez-vous excuser mon long silence? Si vous etiz plus pres de moi, je vous ferais toucher mon cœur; vous le jugeriez, et votre esprit, votre bonté surtout, m'aiderait a ôter un sentiment qui opprime ce cœur, qui est tout a votre famille. Il est bien vrai, cher Orante, que les années se suivent et ne se ressemblent pas: il y a un an que j'était livrée toute entiere à l'amitié, à l'amour, à cet amour de l'âme, qui épure toutes les actions de la vie, qui fait naitre dans le cœur toutes les bonnes idées. Cette année, quelle différence, cher Orante! Il faut pour toumours, il faut à jamais renoncer à des illusions si douces. Ah! vains et chimériques projets des hommes, que devenez-vous contre les lois immuables du destin! . . . Une maladie de poitrine s'étant déclarée en moi depuis un an, a à jamais fait évanouir tous mes songes de bonheur: je vois avec doulerur ce que je dois perdre, et je ne puis envisager sans effroi ce qu' il faut que je quitte. Non, non, cher Orante, il n'y a pas de philosophie qui puisse nous faire envisager le néant de la vie avec sang froid. Nous avons dans les siècles passés des exemples d' héroisme; mais les siècles passés sont loin de nous, et moi qui suis du présent, je sens trés bien que je n'ai pas l'esprit fort des ces messieurs, et une noire mélancholie est presque toumours le resultat des réflexions qui viennent m'agiter, ce qui empire mon mal. Je n'ai pas besoin de vous faire un long detail de cette affreuse maladie, vous la connaissez, puisque le pauvre Settimio[1]

[1] One of Fonzi's brothers.

en est mort. Malheureusement on n'a pas trouvé d'antidote pour un poison comme celui-là. Comme je suis d'un naturel très gai, cela est un petit palliatif, mais beaucoup trop léger pour le mal qui me mine. On se familiarise difficilement avec la souffrance, on finit pour-tant pour la supporter patiemment, mais jamais on ne s'habitue à voir venir la mort. Mon cœur a une maladie qui est pour le moins aussi dangereuse que l'autre: il est d'une sensibilité extrême, et cela ne diminue ni ne calme mes meaux. Je cherche tous les moyens de l'endurcir, mais ce que la nature a fait, elle l'a bien fait. Il faudrait m'étourdir, m'abuser sur ma situation, c'est ce que je fais autant que possible: le diable n'y perd rien; malgrémes efforts de raison, il n'y a d' expressions dans aucune langue pour rendre ce que j'éprouve, ce cue je sens; et quel langage peut rendre certaines douleurs?

"J'ai perdu tout espoir, par ma situation présente de vous embrasser un jour, et de vous dire de vive voix que je vous aime, et que j'aime tout ce qui tient à la famille de mon cher Fonzi. Il m'avait si bien habituée à regarder sa famille comme la mienne, que j'ai fait des voeux continuels pour aller à Orsogna; et cette espérance est aussi perdue pour moi. Dans mon cher Peppangiolo depuis quatre ans, cher Orante, je vois tout mon univers: c'est peut-être une idolatrie de ma part, mais dâns lui je trouve mon Dieu, et le Dieu d'Hélène est celui de la vérité. Mes voeux de bonheur sont désormais tous à lui, je n'en espère plus pour moi: mes yeux, soumis en esclaves aux mouvements de mon cœur, sont inondés de larmes: heureux celui qui peut encore en verser!!

"Conservez—moi dans votre souvenir, cher Orante, croyez que voux resterez à jamais dans le cœur d'Hélène. Mon mari doit vous écrire, mais il est si occupé et il a tant souffert à cause de ma maladie, que vous devez concevoir qu' avec sa paresse naturelle pour écrire des lettres,[1] il mérite bien d'être excusé par son frère.

"Si les voeux les plus ardents que forme mon cœur sont exaucés, tout ce qui porte le nom de Fonzi sera heureux en tout. Voilà quels sont les sentiments d'Hélène, et vous voyez son cœur à découvert: celle que vous avez nommée votre cœur chérie, votre Hélène, pourrait—elle en avoir jamais d'autres, cher et bon Orante? Conservez-moi des titres si flatteurs et si doux, et renouvelez-m'en l'assurance par une prompte réponse; j'attends cela de votre amitié. Je vous embrasse, et suis votre sœur et votre amie pour toute cette vie, et même pour l'autre.

Hélène de Clécy,
femme Fonzi."

After reading this letter, so full of affectionate sentiments and from which one might form the opinion that Hélène de Clécy was not only a woman of great intelligence but of exceptional goodness, one is not a little surprised to come across the following passage in a letter from Fonzi to his brother Orante, dated June 8, 1813:

"The woman who up to now you believed to be

[1] Fonzi, gifted with marvellous activity for professional, scientific and literary work, was very lazy with regard to epistolary correspondence with friends and relatives, as he himself confessed, considering it probably a loss of time; in this he was not altogether wrong.

my wife is no longer in my house. To you and to the public I had given to understand she was my wife, because of the excessive consideration I had for her. That woman is the worst monster that exists on earth. I loved her much, but she has deceived me for the space of three years. I have sent her away and though she merits only contempt, I notwithstanding continue to maintain her; and this because she made me believe for two years that she was going to die from one day to another, announcing an attack of the chest and lungs. The melancholy I suffered in consequence of this caused me eight months of continual illness, and if I had not sent her away I should not now be alive."

We must now turn back a few years and refer to events having a certain interest with regard to Fonzi's private life and professional career.

In the aforementioned letter to his sister Pippa (December 2, 1808) Fonzi complains of the bad reception made him by his brothers on the occasion of his return to Orsogna in 1801.

"My brothers refused to acknowledge me and showed contempt for me; my profession furnished them the motive; but when they had the evident proofs of what this despised profession would be capable of to their advantage they wished to be reconciled with me; but it was too late—I then knew that it was not fraternal love, but vile interest, that moved their hearts."

In the same letter we find the following passage:

"I do not speak to you of myself or of my profession, because I am waiting for the occasion to send you a printed form which by post would cost you too much,[1] and you will then see what my profession has brought me in, the progress I have made and what are my projects."

Under the same date Hélène de Clécy writes to Pippa:

"The description that Peppangelo has often made to me of the Abruzzi has made me wish very much to go there, but for the present this project must be delayed. He is beginning to make a great reputation for himself in Paris, and is detained here by circumstances."

From this letter we may conclude that Fonzi's great renown in Paris began about the year 1808, that is, as we shall see, precisely at the time in which he made known his artificial terro-metallic teeth to the Athenæum of Arts and to the Academy of Medicine of Paris, when he sustained victoriously a stringent argument on the subject with Dubois Foucou.

The following year, that is, February 21, 1809, Fonzi wrote a letter to his brother Orante, also containing some interesting passages. In one of

[1] In those days the postal expenses were always defrayed by the receiver.

them he speaks of the celebrity his inventions have procured him in France and in other nations. He hints besides that his circumstances are sufficiently easy: he says that in one year since his marriage he has furnished a house that represents already a certain value, and speaks of his certainty of soon becoming a rich man, because of his acquired celebrity, and of the carrying out of his projects that has been only temporarily retarded by the war between France and England.

A still more interesting passage we find in a letter to his brother Orante, dated May 1, 1811:

"It would be impossible and at the same time useless for me to try to tell you what I am doing. I will only tell you that I am doing myself honor not only in this capital, but in all Europe as well, where my name is known. I already make large profits, and hope in a few years to have attained a most prosperous position. You think I am amusing myself! Know then, that I have remained in the house without ever going out for four years, so assiduous and heavy was my work. I have created a new art, a beautiful and useful art, and my contemporaries heap blessings and gratitude upon me."

This same letter is also interesting because it reveals Fonzi's goodness of heart and especially his affection for his sisters. Already from an earlier letter (dated June 2, 1809) we learn that

he had contributed to his sister Pippa's dowry, and now, two years later, he does as much for his sister Finuccia. To his brother Orante in fact he writes as follows:

"In your last you speak of the offer of marriage made by Don Panfilo de Lellis, and ask me to help you. I am willing to do so, as this marriage would be entirely to my satisfaction. The difference in question consists of three hundred ducats. This sum I offer as a gift to Finuccia."

In the year 1815 Fonzi was called to Munich by the King of Bavaria; he was assigned an apartment in the royal palace and was there lodged and boarded for four months, during which time he gave his professional services to the King and royal family and to other great personages, to the complete satisfaction of all. Besides the large pecuniary recompense, he received magnificent presents and had also the honor of being appointed dentist to the King of Bavaria.

On his return to Paris his great success procured him considerable envy among professional colleagues. His rivals, in order to ruin him, set on foot an infamous calumny against him. They accused him anonymously of conspiring with foreign States against the safety of France, affirming this to be the reason of his prolonged absence, and that he also retained arms in deposit for the same motive. In consequence of this accusation,

Fonzi had to submit to a rigorous investigation of his domicile and of his laboratory, however without anything of a criminal or suspicious kind being found. The minute inquiries made on his account on this occasion proved clearly his innocence and clearly gave evidence of his honorable and irreprehensible conduct. This event therefore produced exactly the contrary effect to that aimed at by his enemies: that is, the result was to attract still greater attention to Fonzi's person and merits, so that eminent men of the Government declared themselves his friends, ready to protect him in whatsoever occasion, against the malicious intrigues of his enemies.

In the beginning of the year 1816 Fonzi went to London. Unfortunately we know nothing as to the scope of this journey or how long he remained in that metropolis: anyhow we may consider it probable that he went there with the intention of making his inventions better known and perhaps also to initiate some project or speculation concerning them.

In the succeeding years he was twice called to Madrid by the King of Spain whom he treated with great success, thus obtaining still more renown, not to speak of the material profits derived from the regal munificence.

Fonzi was accustomed to travel *en grand seigneur*, spending money with the same facility with which he gained it. He not only took care

Fonzi at Forty-five Years.

From a miniature painting in colors.

to always carry with him professional instruments of great value, but also lodged in first-class hotels,[1] living with great luxury and giving sumptuous dinners to eminent persons of his acquaintance. He believed all this to be necessary for acquiring still greater credit, but undoubtedly it was from his natural tendency to avoid all meanness and narrowness and to seek to surround himself with an atmosphere in harmony with the high level of his own sentiments and ideas.

In 1823 Fonzi went to Russia. He made the journey from Paris to St. Petersburg with his own carriages drawn by post horses. He installed himself at St. Petersburg, and there remained for about two years. He had the honor of serving the highest personages of the Empire and the still greater honor of being named Surgeon-Dentist to the Imperial Court.

He particularly lent his services to the Empress, who, although still young, had lost nearly all her teeth and suffered intensely from the want of them. She was so satisfied with Fonzi's work that she continually made him presents of great value and expressed to him the sentiment of her most lively gratitude, declaring that he had given her life again.

By means of the Empress, the Emperor Alex-

[1] Among Fonzi's papers has also been found the printed address of a first-class hotel in Paris, the Hôtel des Princes, where he lodged for some time after his first arrival in that city.

ander II made Fonzi the proposal of remaining at St. Petersburg at the service of the Court, establishing in that city a school of dentistry. He was to impart instruction to twelve students of the College of Surgeons, and would receive in recompense a considerable life stipend. But he had no intention of remaining in Russia, as he wished to return in a few years to his native land; he therefore refused this advantageous proposal, alleging by way of excuse the unsatisfactory condition of his health.

Just at this time a dreadful inundation of the Neva occurred, causing immense damage and involving many victims; according to the chronicles of the period, it was a most terrific event, and this may have contributed to Fonzi's taking the decision of abandoning Russia; however it does not appear that he sustained any damage.

During his stay in Russia, which was one of the happiest periods of his life, Fonzi kept up an affectionate correspondence with his sole surviving brother, Orante, the parish priest of Orsogna, also a man of uncommon talent, who after a tempestuous youth had embraced the ecclesiastical career.

In one of his letters from St. Petersburg (September 30, 1824) Fonzi speaks of the intention he had had of marrying a distinguished young lady, by name Carolina Sorensen: two letters found among Fonzi's epistolary remains, written

by her in Italian and addressed to Orante Fonzi, indicate that she was a very intelligent and cultured young lady. But the projected marriage never took place, owing, it appears, by what Fonzi affirms in his letters, to the parents of his betrothed: it is extremely probable that it was so, for Carolina Sorensen, speaking in one of her letters of the breaking off of the marriage, does not lay the least blame on Giuseppangelo, and only limits herself to saying that events in this world are predestined by Providence, to whose will we must therefore submit.

Fonzi in the above-mentioned letter says that he no longer reflects on marriage for, although in excellent health, he is already fifty-six years of age. He therefore proposes to return to Paris in the spring, sell everything, and then in the following autumn return home and never more separate from his brother Orante.

In the same letter Fonzi also speaks of his will:

"On leaving Paris last year I left my will shut up in a box full of silver and other objects of value in the hands of my banker whose firm is known as M. Mallet frères et Cie, Banquiers, rue de la Chaussèe d' Antin No. 13, Paris. By this post I am writing to Messrs. Mallet, enclosing a new will in my letter. This will revokes and annuls the preceding one. For greater security, I send a copy of this new will to Monsieur Terras, chargè d'affaires de M. Fonzi, rue Taitbout No. 12,

Paris. In this new will I leave the sums which are lodged in the hands of Messrs. Mallet to my nephews and nieces."

It must, however, be noted that sixteen years later Fonzi, two days before his death, made a new will, wherein he named as sole heir his nephew Nicola Fonzi, successor in his profession at Paris.

In January, 1825, Fonzi left St. Petersburg for Moscow, whither he had been called for professional reasons by eminent personages. He remained there until the month of April, and then returned to Paris, intending, as has been already mentioned, thence to go back to Italy in the autumn. However, in the interval he was called for the third time to Madrid by the King of Spain. A special courier accompanied him to Spain at the King's expense, and at the frontier a military escort awaited him by order of the sovereign and accompanied him to Madrid, where an apartment in the royal palace was placed at his disposal.

Fonzi remained in Madrid about seven months. The King of Spain, much satisfied with his services, named him Dentist to the Court and conferred a pension on him of a thousand ducats per annum, a very considerable sum for those times. But wishing that Fonzi might have a worthy successor in the post of Dentist to the Court, the King

placed under his tutelage an intelligent young Spanish dentist, by name Antonio Rotondo, then seventeen years old; in order that Fonzi should keep the young man with him continually, even when travelling, and instruct him thoroughly in all branches of the dental art and science.

Meanwhile Fonzi had begun to experience that state of psychic perturbation called home-sickness: increasing years, the prolonged life in foreign countries, the want of intimate affection, all combined to make him long for his little native town, Orsogna, so humble and modest, lying so tranquil surrounded with verdure, with its simple inhabitants who would certainly receive with great festivities the surgeon-dentist of European fame, him who had been a spectator of most important events connected with the French Revolution, and who, besides having been an intimate friend of Lucian Bonaparte, had perhaps personally known the great Napoleon, and enjoyed the friendship of the Czar of all the Russias and of the King of Spain. Fonzi imagined how his fellow-citizens would venerate and admire him. He therefore sent considerable sums of money to his brother Orante for building a large country house; he himself indicated the mode in which the rooms were to be disposed, with vestibule, outhouses, stables, poultry-yards, all to be built according to his instructions. In January, 1826, he went to Paris to definitely wind up his affairs,

and in May following he started on his journey to Italy, carrying with him the greater part of his costly furniture, packed in vehicles of his own.

He arrived in Naples on June 5 and wrote to his brother Orante:

"I arrived this morning in Naples. In the beginning of next week I shall lease an apartment, and when I have done so will let you know, so that you may begin your journey and we may have the pleasure of embracing one another as soon as possible."

On June 13 he again writes: "I have taken up my abode at Santa Lucia No. 5, in the Duke Cirelli's palace. The apartment is very large, there is room for you and for others besides." Orante, accompanied by one of his nephews and other friends, hastened to Naples. The meeting between the brothers was most affectionate: Giuseppangelo and Orante had not seen each other since the year 1801; both had grown old!

After the outburst of mutual affection had found vent, our Fonzi expressed the idea of opening a great dental establishment in Naples, similar to the one in Paris. He immediately took the initiatory steps toward this end, but met with an insurmountable obstacle in the hostility of the Minister of Police, Intondi, who reflecting that Fonzi had lived about thirty years in Paris and had been intimate not only with men of the

Revolution but also with the Neapolitan exiles whom he had cordially aided, fearing who knows what dangers for the public peace from Fonzi's presence in Naples, not only refused him the permission to publish a notice in the *Official Gazette*, but menaced him with arrest, which greatly alarmed him.

Fonzi had the clear intuition of the impending danger, and conceived an ingenious idea. Remembering that he was Surgeon-Dentist to the Courts of Russia and of Spain, he one day dressed himself in the uniform of a moscovite functionary and presented himself to the Russian ambassador; afterward, in the uniform of a Spanish functionary, he presented himself to the ambassador of King Ferdinand VII, putting himself under the protection of these two powerful diplomatists. The minister Intondi dared not openly molest him again, also because Fonzi had obtained the favor and support of another minister of the King of Naples, by name Medici. This minister, it appears, was in open antagonism with Intondi: he now not only had Fonzi's advertisement published in the *Official Gazette*, making known to the public that he intended to establish himself in Naples, but of his own initiative he added laudatory expressions thereto. He besides exhorted Fonzi not to change his mind, but to remain in Naples, offering to get him appointed to the service of the Court. The minister Medici

gave Fonzi also another proof of his protection by helping him to resist the unjust pretensions of the custom-house official, Dupont, who had taxed Fonzi's furniture on his arrival in Naples with three thousand francs duty.

But Fonzi, not without reason, was afraid of the minister Intondi who had sent a commissary of police to watch him, and determined to return to Paris. Another motive also induced him to go away, viz, disputes on questions of interest with his brother Orante.

Naples, besides, had never been a residence adapted to him: as the reader will remember, when Fonzi, in 1801, made a brief appearance at Orsogna and went then to Naples with the intention also at that time of establishing himself in that city, he was obliged to leave hurriedly because the Queen Maria Carolina wanted to make a spy of him.

Thus was Fonzi once more forced to quit Italy: thus did his dreams of a tranquil life in his native country vanish altogether. On October 27, 1826, he left Naples by sea for Leghorn and Marseilles, thence to return to Paris. He was accompanied by some servants, as well as by the young Spaniard Antonio Rotondo and by his nephew Nicola Fonzi, whom he intended to teach his profession and leave as his successor.

He landed at Leghorn, but before embarking again for Marseilles he was obliged to make a

trip to Florence, being called by the Spanish ambassador, who required his services.

After his departure from Naples he was saddened and irritated by so many disappointments and because his relatives had greatly wronged him. Of this there is clear proof in a letter written to his brother Orante shortly after his arrival in Paris: the letter is a violent invective against Naples, against his brother, against all his relatives. The following passage is worthy of note:

"That d—— kingdom of Naples is a hell. I shall only return to it when it is possible for an honest man to live there without trembling." The letter closes with these words:

"What I can assure you is, that passing through life I have never met with one soul capable of recognizing and appreciating the immense fount of affection contained within my heart. My excessive goodness has ever been taken for weak-mindedness by those incapable of noble sentiments. Experience and tardy reflection now make me incline, if not to egoism, certainly to misanthropy. By nature I do good; it would be impossible for me to do otherwise; but I despise mankind as unworthy of my affection."

After a certain time Fonzi entrusted the direction of his establishment almost entirely to his nephew, and gave himself up to other studies. Among other things, after prolonged experiments

and immense expenditure, he invented special contrivances for the combustion of coal, chiefly of mineral coal, that is, stoves. This invention procured him a medal of merit portraying King Louis Philippe, and a patent for the sale of his stoves in France, England and Belgium. If this had actually been realized Fonzi might have become a wealthy man in a short time; but, instead, just the contrary happened, probably because Fonzi, notwithstanding his brilliant talents, had not, nor could he have, any experience in commercial matters. So he had only the vexation of having thrown away enormous sums of money, without gaining anything by his invention.

His position had now become most critical: the competition of other dentists had much diminished the number of his clients; his health no longer permitted him to continue travelling all over Europe; the heavy expenses incurred for carriages and horses, for scientific and industrial experiments, had reduced him almost to indigence, so that he was obliged seriously to consider the question of ways and means. To all this was added another misfortune: it was now four years since the payment of the pension assigned him by the King of Spain had been suspended, a royal decree prohibiting the payment of pensions to all those not residing in Spanish territory.

For this reason, and also because the cold climate of Paris no longer suited his present con-

dition of health, Fonzi went and established himself in Spain, that is, at Madrid, leaving his dental establishment to his nephew.

For some years he practised at Madrid, until, in 1835, he was attacked by a terrible illness which endangered his life and obliged him to keep his bed for several months. Having got over his illness, he betook himself to Malaga, there to pass the convalescence. From there, in June, 1836, he wrote a letter to his nephew, Francesco, at Orsogna, in which he expressed his wish to return again to Italy, as he had heard that since the accession to the throne of Naples of Ferdinand II, a just and good king, respectable persons from Spain and France had nothing to fear. To make sure of this, he would send his nephew Nicola to Naples, in order that he might establish himself there, and on receiving reassuring intelligence, he would not delay returning to Italy, there to finish his days.

In the same letter he announces that he shall embark the following day for Barcelona, thence to Marseilles and on to Paris, where he would get rid of his establishment, send his nephew to Naples, taking then his final decision accordingly as circumstances would advise.

With regard to this, it is to be noted that he had obtained a royal decree from the Court of Spain, by which he would be able to enjoy his pension also outside Spanish territory.

But a short time after his arrival at Barcelona Fonzi was again attacked by a long and severe illness, to which he succumbed after four years' suffering, on September 2, 1840.

We have endeavored to represent as exactly as possible, by the help of the documents at our disposal, the personality of this uncommon man, who succeeded by himself alone in making his way in life and in commanding the admiration of his contemporaries by his genial talents.

We have a summary estimate of Fonzi's character and life given us by his nephew Francesco, who thus concludes his biographical sketch of his uncle:

"Giuseppangelo Fonzi, by the extraordinary talents he possessed, by his merits and by the honors he acquired, as well as by all he has written in prose and verse, enjoyed great fame in his public life, which has been transmitted to posterity: in his private life, however, he was not free from defects and committed many follies, in which he wasted much money. He was, besides, prodigal toward strangers and neglectful, during the period of his greatness and opulence, of the family to which he belonged. This indifference may be accounted for as having been caused by want of courtesy on the part of some of his brothers, but this fact did not absolve him of the duty of contributing to raise the family again

to its former condition of prosperity, all the more so because the misfortunes suffered were undeserved and to be attributed to local envy and enmity."

To us this criticism does not appear either just or unprejudiced: it may be that Fonzi, absorbed by his unquiet and feverish life of occupation and by his journeys throughout Europe, sometimes neglected to give news of himself to his family; but from his correspondence we learn that he was most generous with his relatives. In family events, whether gay or grave, he always took part pecuniarily. He contributed to the dowry of his two sisters, Pippa and Finuccia; to his brother Orante he sent considerable sums that were to serve for building a house, and which were instead deviated to make a priest of one of his nephews; he took another nephew, Nicola, with him to Paris, instructed him in dentistry, ceding him afterward his establishment and his numerous clients, and finally, in his last will and testament, named him his sole heir. How can it therefore be asserted in honesty that Fonzi neglected his relatives? To us it appears, besides, that in justice he was under no obligation whatever to show them any generosity. His father disinherited him without any valid reason, only because he had abandoned the paternal roof; some of his brothers, by their irregular conduct,

were rather a dishonor than a credit to his name and theirs; the conspicuous sums sent to the priest, Orante, instead of serving the use for which they were destined, were distorted to other ends; the letters he received from his brothers, his sisters and his nephews were in fact nothing but continual demands for money!

Fonzi had no doubt faults, but who in this world is free from defects? A great human truth lies in the words pronounced by Christ: "He that is without sin among you, let him first cast a stone."

FONZI'S POETICAL AND DRAMATIC WORKS

Giuseppangelo Fonzi held much more to the qualification of poet than to his fame as an eminent dentist and illustrious inventor. This irresistible trend toward poetry was derived from a remarkable natural tendency of which we have an early proof, when, soon after his running away from home, he formed an intimate friendship with the extemporary poet Antonio Natale.

When, as a boy, Fonzi served on board the Spanish vessel, he principally owed his exemption from the material fatigue of manual labor to his poetical vein. On board the ship there was a little snow-white kid, the commander's pet; Fonzi wrote some lines in honor of this pretty little animal, which brought him into notice and gained him the good-will of the captain.

After several years' absence he announces with four lines that he is alive and hopes to see his father again, before the old man closes his eyes for ever.

When the Athenæum of Arts of Paris fully acknowledged Fonzi's great merits, and named him as one of its members, he expressed to that society of scientists and artists his gratitude for the honor conferred upon him by a poetical composition in ternary rhyme.

Fonzi's letters often ended in verse. In one of them, for instance, he writes to his niece, Orsolina, who had lost her father, these lines:

Cara serena i rai,
Apri alla gioia il core,
Il perso genitore
Ritroverai tu in me.

Per me se spendrai
Tue cure affettuose,
In guiderdon le rose
Io spargero ai tuoi pie[1]

Mention should also be made of the following most concise autobiography of Fonzi in only four lines:

Mi die natura un' alma irrequieta;
Sprezzai ne'miei verdi anni esser Giurista;
Civenni Navigante, poi Dentista,
Poi fui qual nacqui, vale a dir Poeta.[2]

[1] Beloved, dry thy eyes, open thy heart to joy; in me thou wilt find thy lost father again. If thou wilt spend thy loving cares for me I will, as a reward, strew roses at thy feet.

[2] Nature gave me a restless soul; disdaining in my youth to be a Jurist, I became a Seaman, then a Dentist, returning at last, as I was born, to be a Poet.

Fonzi's poetical productions are numerous and various; he has written poems, tragedies, dramas, lyrics, sonnets, etc.

It is to be noted, with regard to Fonzi's literary works, that three volumes of prose—*History of Persian Costumes*, *History of the Religions of India* and *The Origin of Gods*[1]—are lost; probably other writings of his may have been dispersed as well; and this is not to be wondered at, when one remembers that Fonzi died in Spain, alone, among strangers, who very likely appropriated his goods.

Almost all Fonzi's works are unedited, and notwithstanding accurate research it has not been possible for me to ascertain whether he ever published any book or pamphlet in Italy. In Paris, besides the polemical writings of which we will speak later and some poetical pieces composed for special occasions, he published in 1825 a poem in three cantos in octave rhyme, entitled *l'Ombra di Luigi XVIII.*[2]

With this poem we will begin our examination of Fonzi's poetical works.

The spirit of Louis XVIII had hardly left his body when, surrounded with splendor and glory, it was transported into the Elysian fields. It passed beyond the Phlegeton and arrived at the

[1] In Fonzi's house, at Orsongna, there is an oil-portrait, in which he is represented leaning his hand on a volume having the title: l'Origine degli Dei (The Origin of Gods).

[2] The Spirit of Louis XVIII, or, more literally, the Shade of Louis XVIII

Stygian swamp, wherein various spirits floated in blood, and among them that of Maximilien Robespierre. The King signs to him with his sceptre to approach. Robespierre, after a moment of stupor, flames with indignation at the sight of the King; and only at the thought that there is still a dynasty in France, prophesies another revolution. The King smiles and begins a philipic against the revolutionary philosophers, against the republicans, against Robespierre and all his followers; he then speaks of the various periods of humanity, of human necessitites and aspirations, justifies the conduct of monarchs, exalts his own deeds and predicts the triumph of the dynastic ideal.

Louis XVIII's words strike on the mind of Robespierre with the force of thunder and lightning; for the first time he colors with shame. He feels his reason break down and, casting down his eyes, remains confused and thoughtful. Already, notwithstanding his unextinguished hatred for the Monarch who is before him, there begins to arise within him a sentiment of respect and, at the same time, of doubt as to the truth of his own ideas. The King meanwhile resumes his discourse. He makes a flattering allusion to Louis XVI, touches the subject of the damage that the Revolution and the Napoleonic wars have caused to France, and rejoices at having given her once more the peace and order she had

lost; he also speaks of the wise and beneficent acts of his own government, and finally sets forth various arguments demonstrating the erroneousness of revolutionary principles and the necessity for the order and welfare of society that the inferior classes be dependent on the superior ones and that a Monarch should be at the head of the government of every State. Robespierre, although struck by the King's reasoning, seeks to confute him, but Louis XVIII replies with such efficacious arguments, that a new light illuminates his spirit, he recognizes his own errors, repents of the crimes committed and, overcoming his sentiments of hatred, asks pardon of the King, who readily concedes it. The spirit of Robespierre sadly floats further away in the bloody swamp, while that of Louis XVIII is wafted toward Elysium, the sojourn of blessed spirits, of which the poet gives an ample description. Majestically seated on an eminence, the King perceives all the immortal progeny of the House of Bourbon. At the sight of the new guest, all the Kings of France go out to meet and to welcome him. The spirit of Louis XVIII then moves around the different regions of Elysium, where, in the order of kingdoms and empires, ancient and modern, are assembled the spirits of sovereigns, of great rulers, philosophers, poets and other eminent men. The author represents the ancient heroes as possessing the power of reproducing at will the glorious

scenes of their past lives, their greatest pleasure being the re-evocation of their own immortal deeds. This affords the author occasion to introduce some fine descriptions, particularly worthy of note that of the Battle of Thermopylæ. Louis XVIII, having made the round of the various parts of Elysium, conversing here and there with great personages and admiring their exploits, goes and reposes by the side of Emperor Augustus. And thus the poem finishes.

If one should pretend to judge this work of Fonzi's from the point of view of historic truth there would be many reservations to be made, in particular because Louis XVIII was by no means the good and exemplary monarch that Fonzi represents him to have been. But the poet is not obliged to hold scrupulously to history. There is a truth which needs neither documentation nor control, and this is *poetic truth*—the truth that appears as such to the mind of the author. The poet is so formed that by the sole force of his imagination he creates a world of his own and peoples it with creatures which are emanations of his brain, subjecting them to laws not to be found in any existing code. The work of art, therefore, must be considered exclusively from an artistic point of view, by the light of its merits and in no other way.

Thus premised, Fonzi's work, *The Shade of*

Louis XVIII, has its literary value, and must not be considered otherwise than as a literary work. Although not the best of his productions, it has intrinsic merits not to be passed over. The poet recalls to mind, with emotion, the atrocities of the French Revolution and the striking fact that the vindictive Nemesis who had submerged in blood the authors of the inhuman butchery brought about an order of things that had appeared buried for ever—the resurrection of the French Monarchy. This memorable historic reaction succeeding the Revolution, the Reign of Terror, and the wars of Napoleon, appears to the imagination of Fonzi an epopœia worthy of poem and song: and it is of little or no importance that Louis XVIII should not have been the just, the generous and valorous Monarch depicted by him. The poet sees in this marvellous return of the legitimist Monarchy the iron hand of destiny, and chants the great and memorable event, exalting the Monarch in whom it was personified.

Another poetic work by Fonzi is entitled *La Rovina del Mondo*.[1]

It was probably intended to be a poem of vast proportions, but we only possess five cantos of it in octave rhyme, the last of them incomplete. The subject of the poem is exceedingly fantastic and does not regard historic facts, but future

[1] The Ruin of the World.

events that are to occur at the end of the Thirtieth Century. In that epoch the Hebrews will destroy the Christian world and the followers of every other religion, and will impose their power over all the earth.

The poet imagines that Adonai convokes in the highest part of Heaven all the Fathers and Prophets of the *Old Testament*—Moses, Abraham, Isaac, Jacob, etc.—and orders them to destroy without mercy the enemies of the Jewish religion, so that there be henceforth in all the world one sole religion and one sole family living in perpetual peace. He entrusts the supreme direction of the great undertaking to Moses, leaving him arbiter as to the means and methods for ensuring its execution. Having imparted these commands, Adonai withdraws from sight of those present, who, after great manifestations of joy, turn to Moses, to learn his commands. Moses holds a discourse in which he reveals to them the plan to be followed for the extermination of the Christians. Although the Hebrews are not wanting in warlike valor, recourse is not to be had to the sword, at first, to destroy the hated races, for in this manner there would be too many victims among the Hebrews themselves. It is necessary, instead, to cause wars and discords to arise among the Christians, so that they should destroy one another for the most part; afterward the vindictive swords of Moses and his people will complete the work of destruction.

Moses sends on earth the spirits of Solomon, of the prophet Balaam, of Esther and many others, who, entering into the hearts and minds of men and women, guide their actions in such a manner as to provoke wars of extermination among the Christians.

In this vast conspiracy Esther has a very important part. She takes possession of the soul of a damsel of great beauty, the daughter of a wealthy and noble Israelite, and so contrives that two brothers, powerful sovereigns of a considerable part of Europe, are fascinated by her arts and her beauty, and both fall in love with her; they become jealous of one another and their deadly enmity causes a tremendous war to break out, such as was never seen before.

This poem, in which Fonzi's fertile intellect has created in great number interesting and marvellous events, would suffice even by itself alone, though incomplete, to give a clear idea of the admirable poetical gifts of the author, and particularly of his extraordinary power of imagination.

But the most important of Fonzi's poetical productions is a poem in thirty long cantos in ternary rhyme, entitled *The Impostor*.

While Fonzi in his earlier work, *The Spirit of Louis XVIII*, exalts the principles of Monarchy and Religion, and shows himself the fierce adversary of revolutionary and subversive ideas, in the

present work, *The Impostor*, he sets the regal power and religious institutions in the most unfavorable light. This grave contradiction cannot be explained by supposing the two poems to have been written at two different periods, in which the opinions of the poet were different. It may in fact be held as certain that both were written in the latter period of Fonzi's life, that is, at a time when it is not all probable that his ideas in a few years should have undergone a radical change; besides which, it may be observed that in the poem *l'Ombra di Luigi XVIII* one already detects traces of the ideas afterward evolved in *The Impostor.*

A more plausible explanation is that Fonzi considered religion and regal power as two evils originating in imposture and violence, but nevertheless as two evils necessary to social order. With regard to this proposition we may here cite an opinion of the great poet and thinker, Leopardi: "Imposture is, so to speak, the soul of social life, an art without which, indeed, no other art and no faculty, considered by its effects on the human mind, is perfect. Nature itself is imposture toward man, and his life is only rendered pleasant or supportable by means, principally, of imagination and illusion."

Many things in this world, in fact life itself, are at the same time a good and an evil: the poet may therefore, according to the point of

view from which he sees them, represent them in different manners. This contradiction therefore need not cause any surprise.

The period in which the action of the poem *The Impostor* is laid is lost in the dark ages; we must go back to the earliest dawn of civilization, when Man, until then living in perfect freedom, allows himself to be terrified and seduced by the first priest-impostor who speaks to him of divinities, dispensers of life and of death, of joy and of pain, and renounces freedom, reason and the beauties of savage life. This primeval priest-impostor makes an alliance with the brute force of the first King, anointed by him, and thus is initiated the sacerdotal and monarchical descendency, cause of innumerable woes to the world.

Such is in substance the subject of the poem. Let us, however, give a short summary of it:

The Impostor says that the Sun, the Moon, the Stars are so many gods. Man, still but a savage, asks who are the gods: the Impostor explains that they are beings like himself, but purer, more perfect, who command the elements and have the power over good and evil that befalls man. Afterward, one day, he says, that the Sun-god has appeared to him in human shape, at the foot of a certain mountain, commanding him to build a temple wherein to worship him and sacrifice victims in his honor, and empowering him to govern all men in his name. The credulous masses adore

and venerate the Impostor, build a temple to the Sun-god, renounce the life of freedom and submit themselves entirely to the sacerdotal authority.

The temple being built, the Impostor hastens to make known that he has received direct from the Sun-god the laws to be observed by the people. These laws are: (1) Adoration of the Sun-god and of none other; (2) renouncement of liberty; (3) abdication of reason; (4) blind obedience to the divine commands; (5) sanctification of ignorance; (6) obligatory payment of annual tributes to the Sun-god and sacrifice of victims (for the present, the choice flower of the flocks and herds, later on also human victims); (7) recognition of the inviolability of the priest; (8) the burning alive of heretics and of all those who would seek to penetrate into the intimate mystery of things; (9) indissolubility of matrimony; (1) acknowledging the sentiment of honor to be the guide of one's actions—a sentiment of honor, however, that may vary according to circumstances and persons. There are also other laws of minor importance that the people accept with equal enthusiasm and fervor.

Meanwhile winter sets in, and is followed by cold, misery and hunger. The people rush to the temple and implore aid, but the Impostor announces that the god Typhon, otherwise called Fate, has risen up against the Sun-god. He is the great genius of evil and is superior to all the

other gods and hinders the Sun-god from doing good. The people are terrified, and see in the tempest, the lightning, the thunder, and even in their own shadow, the implacable work of Typhon continually persecuting them.

The Impostor, now speculating on the terror of the masses, proclaims himself high Pontiff, taking the name of Acca I, names his wife Argina, priestess of the Sun, adorns himself with precious robes and imposes on the faithful, as a sacred rite and sign of recognition, to cut off one ear: and so this people was henceforth known as the *Mozzorecchi*, that is, *ear-cutters*.

However, among the masses a certain movement of revolt against Acca begins to make itself felt, for the evils that oppress the people cause them to desire their former life of freedom in the open fields; but Acca proclaims repressive laws, creates spies, thrusts into prison the principal instigators of revolt, and has them strangled. A rebel who dared to affront him and insult the god whose minister he declares himself got the worst of it, for Acca had him impaled and burnt alive.

But the people are discontented and ever meditate how they shall regain their liberty. Acca, who perceives his power diminish, has recourse to astuteness: he says that the Sun-god has revealed to him that happiness is not to be found in this world but only in another, and that in order to acquire it one must suffer the evils of this life

with patience and resignation. He also relates that he has been transported in ecstasy to the skies and has seen the regions of bliss reserved to the Mozzorecchi. The people are subjugated, and give themselves up to penitence to gain the Paradise. Acca now institutes the Priests of the Sun, who are to act as mediators between the god and Earth.

Meanwhile, an invasion of Scythians, led by the powerful chieftain, Arballa, is announced. But Acca is in no way discouraged, and gives the people to understand that the advancing multitude is composed of celestial persons sent by the Sun-god. He then sends magnificent gifts to Arballa, carried by a group of young maidens, and at the same time invites him to crown himself King of the Mozzorecchi. Arballa receives the embassy of young maidens, and falls in love within one of them, called Arimena. On his arrival, he is received triumphantly by Acca and all the Mozzorecchi. Acca presents him to his faithful people as the son of the Sun-god, and commands them to do honor to the celestial guests, placing at their disposition their dwellings, their wives and daughters. The credulous people, of course, consent.

Now an incident occurs that might have assumed serious consequences. Arballa was the first to believe himself really the son of the Sun-god, and in a private colloquy desires to know from Acca

full and precise particulars. But Acca, to whom is well known the real origin of the Scythian leader, with too great frankness reveals to him that what he has said was merely with the intention of mystifying the people, that there was not a word of truth in it, and that he, Arballa, instead of being the son of the Sun-god, was born in a robber's den, the offspring of a female who was the servant and harlot of the whole band. At this offensive revelation, Arballa burns with rage and indignation, and grasps his sword to punish the vile impostor. But here Argina intervenes and disarms Arballa, speaking to him, more or less, to this purpose: "Acca is a monster, who feeds the people on lies. Now, if you, Arballa, prefer to live a nomad life, then kill him, for he well deserves it; but if you wish to reign, you cannot do less than ally with him. I see, in the centuries to come, Force united with Fraud and mutually sustaining one another. Force is the greater star, Fraud is its indispensable satellite. Without the aid of Acca, you will not be able to reign, for only through him you enjoy the respect and veneration of the people."

Arballa is convinced and makes his peace with Acca, who professes his willingness to serve him, but makes him understand that in order to maintain himself on the throne he must deceive the people and, at least in appearance, be submissive to him, the great Pontiff, representative of the

Divinity. Thus the regal and sacerdotal power will be reinforced, completing one another, and it will be possible to rule the people and take advantage of their ignorance.

As Acca had made the people believe that the celestial blessings were reserved solely for the Mozzorecchi, it now became necessary that Arballa and his Scythians should embrace this doctrine and submit to the ritual amputation of one ear. This they willingly did, and the following day the symbolic rite of purification and loving kindness was performed with great solemnity, and pompous discourses were pronounced by Arballa and Acca.

Arballa is quite content, and after a certain time proclaims the general rules and laws that are to govern the State, among which the following are the principal ones: The State is constituted by the priests and the Scythians, who will occupy all the public charges. The people are to cultivate the soil for a mere living-wage, from which, however, they are obliged to subtract the tributes destined to the King and the Ministers of Religion. The Priests are divided in two classes, the higher and lower clergy; the former live in opulence, the latter practise poverty and fasting, to set a good example to the people. Among the Scythians, those who have distinguished themselves by services rendered to the Sovereign or by deeds of valor will form the aristocracy, that is, the titled class. The King

concentrates in his own person the civil, military and judicial powers, but can, if it so please him, delegate them to others. The people are deprived of all rights and shall simply obey.

Argina, whom the poet has endowed with the faculty of divination, now foretells the day when the people will free themselves from slavery and there will be brotherhood among all peoples. Arballa is struck by this prophecy and would almost be disposed to give liberty to all; but Acca, his evil genius, dissuades him, saying: "If you, but yesterday, have created lords and servants and have given power and honor to your Scythians, how can you now retire these privileges and proclaim equality, without provoking a rebellion?

"It is true, you might use force to daunt the rebels, but who could guarantee you against their secret vengeance? It is necessary, therefore, to maintain slavery."

Arballa, who wished for nothing better than to be convinced, yields to Acca's reasoning; being, however, somewhat preoccupied about Argina's prophecy, he asks by what means his descendants will be able to keep the regal power in their hands as long as possible, it being his wish to hand them down Acca's counsels on this point. Acca replies in these terms: "Your sons and descendants must be despots as you are. By bestowing honors and riches, you shall endeavor to gain the favor of those who are powerful, if

by chance they be loth to serve you. Only one class is to be feared—the learned. But against science I will provide to let loose superstition, imposture and the dread of another world. I will so order things that great actions be maintained as impious, that truth be taken for error and liberty for license, that the greatest happiness shall consist in ignorance and servility, that terror shall appear to be justice and cruelty clemency, that the severest oppression be considered the best form of paternal government. On your own account, use always violence, and when you cannot check revolt, pretend to second it, swear and forswear at the right moment, foment civil war, train yourself to treachery and fraud, and when the hour comes, crush your enemies. Arballa accepts Acca's counsel with enthusiasm, which in the course of centuries became, so to speak, the *Magna Charta* of all dynasties.

In this poem, even more than in the two preceding works already examined, Giuseppangelo Fonzi's force of imagination reveals itself. This vast poetical composition is the echo of all the philosophic theories of that period, and particularly of the philosophy of Jean Jacques Rousseau. The ampleness of conception, the introduction of the marvellous, the warmth of inspiration, the interesting episodes woven in throughout, as well as the harmony existing between the different parts, give to this poem a high literary value, and

render it worthy of admiration. Among its merits must also be mentioned the flowing sonority of the verse and the beauty of the terza, which more than once recall to mind the terzarima of Dante.

This work, like all those inspired by religious ideas or political passion, might give rise to bitter discussion and contradictory opinions on its value, to exaggerated exaltation on one hand, to acrid and contemptuous criticism on the other. But the value of a literary work can especially be estimated from the currents of sympathy and antipathy, of admiration and repulsion it is capable of engendering. If Fonzi's *Impostor* were published it would probably let loose a tempest of fervid discussion; on the one side enthusiastic praise, on the other vituperation.

The whole poem is a violent and ferocious infective against all religious faith. Fonzi takes as his point of departure the idea that every form of religion is a mystification astutely created for the purpose of tyrannizing humanity; he maintains, besides, that society has enslaved man, reducing him to misery and unhappiness; in short, that civilization has considerably worsened his condition. The sole remedy for these evils would be a return to a state of Nature, that is, to primitive savagery, or else to exalt Science, putting her in the place of all divinities of the ancient and modern Olympus. These theories, that contain perhaps a mixture of truth and error, will be

found absurd by many at the present day, and it is certainly not worth while to examine them critically, for, true or false, Fonzi's philosophical theories neither add to nor take away from the poetic value of his work. We may merely remark that to judge fairly and be able to comprehend a literary production one must take into account the period in which it was written. To realize the genesis of this poem of Fonzi's, we must return to the times of the Encyclopedists, of Jean Jacques Rousseau, of the goddess of Reason. The tyranny of Princes and of the Church had at that time given rise to a violent reaction of conscience; the hatred accumulated during so long a time then burst out and overflowed like fiery lava, burying alike divinities and priests, theological dogmas and moral canons, rights and privileges of kings and nobles. Fonzi's poem is a direct emanation of this period; it is therefore not to be wondered at, that as a genuine production of the times, it should be distinctly revolutionary and destructive in its tendency.

Fonzi's genius, so multiform in its manifestations, shines also in his dramatic works. We have five tragedies of his and two dramas in verse, besides a very pretty comedy in prose, *Il geloso convertito*.[1] The third act of this comedy has

[1] The Jealous Man Converted.

unfortunately been lost, together with other writings.

One of the two dramas is entitled *La Superstizione distrutta*,[1] It treats of the campaign initiated in India by the English for the suppression of idolatry and of the barbarous religious precept that imposed upon widows death on the funeral pyre of their husbands, so that their souls might be reunited to those of the defunct consorts in the next world.

The lyrical drama entitled *Il ritorno di Ulisse*[2] is of a ligher character. The subject is the legendary fidelity of Penelope, and Ulysses' return to Ithaca after his extraordinary adventures.

This work is perhaps the least remarkable of Fonzi's dramatic productions; notwithstanding that it demonstrates the admirable facility he possessed in dramatic composition of every kind.

More importance is to be attributed to his five-act tragedies, all in verse, entitled *Culicano*, *Il Terrore e la Vendetta*, *l'Atto di Fede*, *Il Finto Reo* and *Polinesso*.

The dramatic action of *Culican* takes place in Persia.

Culican is a bandit chief, gifted with great intellect and extraordinary courage, and famous throughout Persia. He was formerly an honest

[1] Superstition Destroyed.
[2] The Return of Ulysses.

citizen, but an iniquitous sentence having deprived him of all his goods he had become a bandit, in contempt of all social laws and moral principles. A conspiracy of nobles drives the King from the throne, and together with his daughter Zelide he goes and asks assistance of Culican, who becomes enamoured of Zelide's great beauty. He succeeds in reëstablishing the King on the throne, and now asks the hand of Zelide as his recompense. She refuses with courtesy, by saying she is averse to matrimony, but professing at the same time her perfect esteem and gratitude for her deliverer and her father's. Culican, hurt by this refusal, swears to himself to win Zelide at whatever cost. He had become, in fact, if not in name, the ruler of the realm, and now, in order to win his beloved, proposes to seize the throne. With this aim, knowing himself to be hated by the nobles as much as they hated the King, he favors a conspiracy set on foot against himself and the Sovereign, and plots in such a manner that the King is in fact the victim of the conspiracy, and that the nobles who have invaded the Royal palace are all killed, while he himself, in the eyes of Zelide, appears to be once more her deliverer and at the same time the avenger of her murdered father. In consequence, she spontaneously offers Culican her hand, her affection, and together with these, the throne.

The subject of the tragedy entitled *Il terrore a*

la vendetta[1] is the patriotic conspiracy of Giovanni da Procida, which led to the Sicilian Vespers.

In the tragedy entitled *Atto di fede* (that is, Auto-da-Fe) Fonzi stigmatizes the horrors of the Inquisition. Eugenio, Marquis of Belfonte, a good, intelligent and charitable man, and his virtuous wife are accused of impiousness, because they believe in God alone and not in the Catholic dogmas. They are imprisoned, but still courageously maintain their opinions, although well knowing that they go to meet torture and death. In fact, the Holy Office condemns them to die in boiling water, and to render their martyrdom still more atrocious, condemns also their two sons, still but children, to the same barbarous death, and orders that the children be first put to death under the eyes of the parents!

In his tragedy *Il Finto Reo*[2] Fonzi shows up the fatal effects of caste prejudices, and especially of the prejudice that makes the patrician refuse to consent to a matrimonial alliance with a plebeian family. Gerardo, a patrician of Zurich, has a son named Uberto, who falls desperately in love with the daughter of one of his farmers, Clotilde, a girl of great beauty and possessed of every virtue. He promises to marry her, but his father resolutely opposes the marriage. The enamoured youth in vain represents to his inflexible father that Clotilde

[1] Terror and Vengeance.
[2] The False Criminal.

is about to become a mother, and that he is bound in honor to maintain his promise. Uberto therefore decides to flee with his beloved to other parts and there to live by his own work. But all his movements are spied upon by a confidant of his father, named Onofrio, a bad and sanguinary type of man, who succeeds by underhand means in suppressing the new-born infant, and causes Clotilde to be arrested on the charge of infanticide. She is condemned to death, but Uberto, to save her, declares himself to be the murderer of his child, and dies on the scaffold.

The last of Fonzi's tragedies has as the subject of its plot the rivalry between a noble Scotchman, Polinessus, and a valiant warrior, Ariodant, who has saved his country by gaining a great victory over the English forces. Ariodant loves Ginevra, the only daughter of the King, and she returns his love. Polinessus, confiding in his high birth, considers himself far worthier of espousing the heiress to the throne than his rival, whom he stigmatizes as "a mercenary adventurer." He decides to supplant him, and offers his hand and heart to the princess, but receives a firm and contemptuous refusal. He swears to be revenged, and weaves an infernal plot tending to dishonor Ginevra, provoke a popular revolt and seize the throne for himself; but the plot is discovered, and he, seeing himself ruined, flees the country, but is overtaken and slain.

All Fonzi's tragedies can be read with great interest, for the dialogue is always lively and animated in such a manner as to portray the contrasting passions and sentiments. The various psychological situations are always rendered with great fitness and ability. The versification is robust, sonorous and flowing. But we do not intend to imply withal that these tragedies, and Fonzi's poetical works in general, are without defects. The Gallicisms to be met with here and there (easily explainable when one remembers the author's long residence in France), are unpleasing, and jar particularly on the Italian reader. It is also to be deplored that, probably from want of time, Fonzi did not subject his literary works to that patient process of revision, which even the greatest writers have always found indispensable for attaining perfection.

However, from the examination of his works, it clearly appears that Fonzi was a man of extraordinary and original talent. His stormy and romantic youth, the intense laboriousness of his maturer years, his particular devotion to science and to the dental art, besides his continual travels, took him away from literature, to which he only devoted the earlier and the latter years of his life; but if he had dedicated himself exclusively to poetry Italy might, without doubt, have enumerated him among her greatest poets. Indeed, his fertile genius, his facility of poetical expression,

his marvellous imagination and his generous loving heart showed him to have been chosen by Nature as a poet. Fate, instead, deviated the course of his life toward other channels; it was destined that he should win fame and be known to posterity much more as an eminent dentist and inventor than as a poet and man of letters.

THE INVENTION OF MINERAL TEETH

It is not always easy to decide to whom the merit of an invention belongs. Almost every invention has, in fact, its precursors, for in the intellectual world as well as in the material world, all is produced by gradual evolution. It must also be considered that the fundamental idea of a given invention has often as much importance as its practical application, so that all the merit is attributed by some to the first enunciator of the new idea, and by others to him who first makes the practical application of it. It is not, therefore, to be wondered at that so many discussions have arisen about the priority of certain inventions, and that, also about the invention of mineral teeth, very different opinions have been expressed. It will be, however, an easy matter for us to demonstrate that the principal merit of this invention incontestably belongs to Giuseppangelo Fonzi.

Until the end of the Eighteenth Century the materials generally used for dental prosthesis

were bone, ivory, the teeth of the hippopotamus and other animals (ox, wild boar, etc.), and also human teeth, which were mostly extracted, for this purpose, from the jaws of corpses in the anatomical halls and in the cemeteries.

Apart from the danger arising from the possible transmission of serious diseases when human teeth were employed in dental prosthesis, the most general inconvenience resulting from the use of organic materials for this purpose consisted in the fact that the artificial teeth of this kind absorbed little by little the oral secretions, underwent a change of color, acquired a very disagreeable odor and, besides, underwent a gradual wasting, owing to the dissolving action of the oral secretions and of drinks.

It was precisely from such inconveniences that in the mind of an intelligent patient there arose the happy idea of having a porcelain denture made for himself.

The chemist Duchateau, in Saint Germain-en-Laye, near Paris, had been wearing for a length of time a denture of hippopotamus ivory, which, as was always the case with the prosthetic pieces of that time, had acquired a very unpleasant odor. Besides which, Duchateau being obliged, by reason of his profession, often to taste pharmaceutical preparations, his denture had become impregnated with medicinal substances which maintained a very bad taste in his mouth and, in addition to

this, imparted a medicinal taste to everything he ate. By thinking frequently of this disagreeable source of annoyance, and of how it would be possible to get rid of it, Duchateau conceived and gradually matured the idea of having a porcelain denture made, on the model of the ivory denture he wore.

In 1774 he applied to the porcelain manufactory of M. Guerhard, in Paris, for the carrying out of his design. But the first trial was not at all successful, for in the baking the porcelain paste contracted so much that the denture had no longer the right dimensions.

In order to remedy this inconvenience, Duchateau caused a somewhat larger denture to be made, calculating its dimensions upon the contraction which the first one had undergone, so that the baking might reduce it to the required dimensions. But the result did not correspond to his ideas, and many other trials were necessary before Duchateau could obtain a denture which he judged good enough for use. Its too white color was, however, unpleasant to the eye, so he had a slight yellowish tint, resembling that of the natural teeth, given to it, and this color fixed by a second baking, as is usual with painting on porcelain.

Duchateau tried in vain to wear this denture, but it proved unserviceable. He therefore was obliged to put it aside and begin new experiments.

These were made with a special kind of porcelain paste used in France for the first time in 1740 (soft porcelain of Sevres), which vitrified in baking at 12° to 25° by Wedgwood's pyrometer, while the usual (hard) porcelain required a temperature of 72° to 75° by the same test. The results, however, were no better than the preceding ones.

After these new failures Duchateau applied to the dentist Dubois de Chemant, of Paris, for his collaboration, rightly thinking that the special knowledge of a dentist would prove very useful for the attainment of his purpose. In fact, after various experiments made in common, a denture was finally obtained which fitted the gums fairly well and which Duchateau was able to wear.

Encouraged by this success, he tried to make similar dentures for people of high rank, hoping to gain much money thereby; but it was quite impossible for him to succeed in his enterprise, owing to his want of knowledge of the dental art. However, in 1776 he laid this new process before the Royal Academy of Surgeons in Paris, which thanked him for his communication and awarded to him the honors of the sitting.

While Duchateau, discouraged by his failures, left off his trials entirely, Dubois de Chemant continued with indefatigable activity to work for the improvement of the new prosthetic method. He gradually introduced considerable modifications into the composition of the mineral paste

employed for the manufacturing of the prosthetic pieces, incorporating therewith Fontainebleau sand, Alicante soda, marl, etc. His experiments and researches aimed at three principal ends, namely: (1) To obtain in his prosthetic pieces tints corresponding to the various gradation of color of the natural teeth; (2) to arrive at a rigorous calculation of the contraction of the mineral paste in the baking, in order to be able to make prosthetic pieces having exactly the desired form and dimensions; (3) to improve the means of attachment, and especially the springs, by means of which the dentures of that period were retained in position.

By dint of intelligent work and great perseverance Dubois de Chemant gradually obtained fairly satisfactory results; when, in 1788, he published his first pamphlet on mineral teeth, he had already made complete dentures and partial prosthetic pieces for a certain number of people, who, according to some reliable evidences, wore them advantageously.

The chemist Duchateau had done nothing at all from 1776 to 1788, that is, during the twelve years subsequent to his communication to the Academy of Surgeons. His sole merit was to have conceived a happy idea and to have attempted to utilize it practically; but he cannot at all be considered as the inventor of mineral teeth, since an invention is only really made when it is possible to put it into practice.

Dubois de Chemant would be better entitled to be considered as the inventor of mineral teeth, but we shall see that the merit of this invention must be attributed in a still greater measure to Giuseppangelo Fonzi.

In 1789 Dubois de Chemant made his invention known to the Royal Academy of Sciences, which criticized it in a very favorable manner. In consequence of which, he soon after obtained an inventor's patent from Louis XVI.

Dubois de Chemant's successes now aroused the envy of many of his colleagues, and especially of Dubois-Foucou, the King's dentist, who, together with the greater part of the dentists of Paris and the chemist Duchateau, brought an action against him, maintaining that he has usurped Duchateau's invention, and demanding consequently the annulment of the inventor's patent that the King had granted him. But the law courts, giving judgment on January 26, 1792, rejected the demand for annulment, recognized the full validity of the patent obtained by Dubois de Chemant, and ordered Dubois-Foucou, Duchateau and their associates to pay the costs of the judgment.

But notwithstanding the unquestionable merits of Dubois de Chemant, it cannot at all be affirmed that he was the inventor of mineral teeth in the sense given today to this term. Dubois de Chemant's mineral teeth and those now in use are two quite different things; the difference is

as great as that existing between the primitive printing of the Chinese by means of wood blocks and the modern printing with movable types, invented by Gutenberg. In fact, Dubois de Chemant's prosthetic pieces were formed by one porcelain block, while the idea of manufacturing "single mineral teeth" quite similar to those now in use, and of attaching them, one by one, to a metallic base, is incontestably due to Giuseppangelo Fonzi, who, therefore, in the history of modern dental prosthesis has the same honorable place as Gutenberg in the history of printing.

Fonzi's teeth were furnished, quite like the mineral teeth nowadays in use, with small platinum hooks that were inserted in the mineral paste before baking, and by means of which the teeth could be soldered to their base.

While Dubois de Chemant's dental blocks were made, each for a particular individual, Fonzi manufactured, in like manner as is practised in our days, assortments of mineral teeth, with which it was possible to construct dentures for anyone. It is therefore evident that Dubois de Chemant's prosthetic system, compared with that of Fonzi, was as primitive as the ancient Chinese printing with blocks of wood in comparison with modern printing.

The great imperfection and inferiority of Dubois de Chemant's prosthetic system appears very clearly from the following considerations. He

took the cast of the part on which the prosthesis was to be applied, and obtained from it a model upon which he formed the porcelain block, destined to substitute the missing parts (teeth and gums). This block, after being moulded on the model, had to be baked in the porcelain oven. But as the baking effected a contraction, it was necessary to counteract this source of error. Therefore Dubois de Chemant, after having calculated by means of preliminary experiments the degree of contraction that his plastic material underwent by the baking, gave to the blocks before baking them a greater length, height and thickness, in accordance with the degree of this contraction. By this means he was able to obtain prosthetic pieces which, as a whole, had the required dimensions, and to which he then made some retouchings by means of special grinding apparatus, so as to render their fitting as far as possible more exact.

But it is easy to understand that it was almost impossible to obtain a perfect fitting; and this, for reasons that were brought into full evidence by Fonzi in his *Answer to Dubois-Foucou*,[1] who followed essentially the same prosthetic method as Dubois de Chemant.

Here are the words of Fonzi on the subject:

[1] This Answer will be discussed further on.

"This process is inadmissible: it is not possible to make by it a denture that can well fit the mouth.

"If a piece having an equal surface has to be made it will no doubt be easy to enlarge it in all dimensions, reckoning the contraction so that it may, after the baking, *very nearly* fit the model. But, if the piece has quite an irregular surface, with many little projections and depressions, as are presented by a toothless jaw, how would it be possible to reckon the contraction of such a piece in all its parts, and how could it be made to *exactly* fit a jaw having such an irregular surface? I say, *exactly*, for this condition is essential: without it the pressure could not be equal on the whole surface, but would act especially or exclusively upon certain parts, thus inevitably producing irritation, inflammation and pain, that would impede the highly important function of mastication. Such a piece could only serve as an ornamental one; it would not be of any practical use. I defy Mr. Dubois-Foucou to make, by his processes, a denture that can well fit the inequalities of a jaw."

We clearly see, then, that the making of prosthetic pieces formed by one porcelain block represented an extremely imperfect and absolutely primitive system, which could, at the most, give some useful results in the hands of highly skilled

workmen, such as Dubois de Chemant undoubtedly was, but which, apart from these rare cases, could only result in failures, and was therefore quite incapable of being put into general use.

The evident proof thereof is given by the fact that this prosthetic system—contrived by Duchateau and put into practice for the first time by Dubois de Chemant—was completely abandoned after Fonzi's invention. There is, therefore, no doubt whatever that Fonzi must be considered as the true inventor of mineral teeth in the modern signification of this term, for it was he, and only he, who invented the single mineral teeth fixable upon bases. Duchateau and Dubois de Chemant have, however, the incontestable merit of having prepared the way to Fonzi's invention, in other words, of having been his precursors.

It must also be noted that Fonzi's invention acquired a still greater importance in consequence of accessory inventions and technical improvements, constituting together with it an immense progress in dental prosthesis.

Fonzi worked assiduously for many years with the purpose of bringing his mineral teeth to a high degree of perfection, and fully succeeded therein, being aided in this task by his profound and extensive scientific knowledge and by his inventive genius.

If we examine Fonzi's mineral teeth—of which there are still in existence very numerous speci-

mens that are now in my possession—we are quite surprised by the beauty of most of them, both as regards the perfection of their anatomical form and their appearance, quite similar to that of the natural teeth. The best among Fonzi's teeth are no wise inferior to the teeth manufactured nowadays; nay, some of them are incontestably even more beautiful.

Fonzi called his mineral teeth "terro-metallic," in order to indicate that their composition was notably different from the porcelain paste employed by Duchateau, Dubois de Chemant and Dubois-Foucou.

Owing to their special composition, the terro-metallic teeth were chemically unalterable, and possessed besides a very high degree of hardness and resistance, such as was quite impossible to obtain with the simple porcelain pastes. Thus, the composition of the terro-metallic teeth was also to be considered as a special invention.

For the manufacturing of his mineral teeth, Fonzi made use of the following substances:

1. Argillaceous earth of Limoges, known under the name of kaolin or porcelain-earth.
2. Earth of Vanvres.
3. Petunzee or flint of Limoges.
4. Oxide of titanium.
5. Oxide of zinc.
6. Oxide of uranium.

7. Oxide of manganese.
8. Oxide of gold.
9. Ammonio-chloride of platinum.
10. Platinum filings.
11. Gold filings.

One of these substances, the petunzee, or flint of Limoges, reduced to very fine powder, entered only into the composition of the several enamels that Fonzi employed for his mineral teeth. He made use of twenty-six different enamels, whose composition was always in a certain relation with that of the various pastes used for forming the principal mass of the teeth, for, according to the tint which he wished to obtain, Fonzi varied the composition of the paste and the enamel employed for their manufacturing.

In an unpublished *Treatise on Odontology*, of which we shall speak further on, Fonzi gives us the formulas of all the pastes and enamels that he employed for his terro-metallic teeth. (See Appendix I, p. 122.)

These formulas were intended for the manufacturing of teeth of twenty-six different tints; but as a matter of fact the number of hues that he obtained with his pastes and enamels was almost infinite, for, besides the composition of the paste and enamel, the action, more or less intense and more or less prolonged of the heat, had also a notable influence upon the hue that the teeth acquired in the baking.

One of the characteristics of Fonzi's mineral teeth was that they perfectly reproduced the living appearance of the natural ones. He obtained this result principally by the use of the oxide of gold.

"This oxide," he writes on p. 170 of his *Treatise on Odontology*, "is perhaps of all oxides the one that possesses the most intensive and active coloring properties. It is used in very small doses; notwithstanding, it often happens that it gives too vivid a color to the paste and enamel into the composition of which it is introduced.

"In order to clearly understand what I have just said, it is well to remember that our teeth, though made of a substance that seems inert and stony, are animated notwithstanding by a vital principle, in consequence of the blood circulation that exists in them as well as in every other part of the body.

"It results from this, that the color of the living tooth has something lively and animated which the dead tooth, deprived of its nutritive juices, does not possess at all. The oxide of gold has the property of communicating to the substances employed for manufacturing the mineral teeth this living tone; without it the color of the incorruptible teeth would always have something dull and dead. But, as every excess is a fault, it is necessary to keep within proper limits the vivifying property of this coloring principle."

It clearly appears from the evidence presented that the mineral teeth made by Fonzi, besides the advantage that they could be fixed simply to a base, just as is universally practised today, offered two other great advantages, namely, that of possessing a high degree of hardness and a perfect unalterableness and of wonderfully imitating the natural teeth by the perfection of their anatomical form, by their living appearance and by the variety of their tints which enabled the prosthetist to harmonize their color with that of the natural teeth still existing or with the complexion and the general appearance of the face in edentulous patients. For all these reasons Fonzi's terro-metallic teeth represented a real creation, incomparably superior to the more or less primitive results achieved by Duchateau, Dubois de Chemant and Dubois-Foucou.

Fonzi's inventions and innovations concerning not only the manufacturing of mineral teeth, but also the processes of construction and application of the prosthetic appliances, were acknowledged and fully appreciated by two most competent scientific bodies, namely, by the Athenæum of Arts and by the Academy of Medicine of Paris

On February 10, 1808, Fonzi asked the Athenæum of Arts to name a commission to examine the mineral teeth invented by him and present a report thereon.

His request was granted, and the Athenæum

named for the above-mentioned purpose a commission of four members, namely: For the medical part, Dr. Fabrè, member of the Academy of Medicine of Paris; for the chemical part, Mr. Guiart, Professor in the School of Pharmacy; for the mechanical part, the mechanical engineer Lenoir, constructor of physico-mathematical instruments for the French Marine; finally, as an adjunct commissioner, Mr. Luton, an expert in the art of enamelling and of gilding on glass and porcelain.

The Commission presented their report on March 14, 1808. This was then approved in the general assembly of April 4, read in the public sitting of May 15, and finally published in the *Journal of Arts, Sciences, Literature and Politics.*

This report, drawn up by Dr. Fabrè, constitues an historical document of capital importance concerning the invention of mineral teeth. We therefore give it here in translation:

Report on the Artificial Terro-metallic Teeth of Mr. Fonzi, Surgeon-Dentist.

You have named Messrs. Guiart, Luton, Lenoir and myself for examining the artificial incorruptible teeth presented to you by Mr. Fonzi, Surgeon-Dentist, living in Paris, Place des Italiens.

Your commissioners are so much the more pleased at having been chosen for accomplishing

this task, as this has procured them the pleasure of knowing and appreciating one of those valuable men, who, by uniting to a great experience in their art an extensive knowledge in physics, chemistry, natural history, mechanics, etc., are able to reason all their researches, make all their experiments useful and thus hope to attain perfection.

Such, Gentlemen, is the distinguished artist on whose talents and works you are today to pronounce.

We will not dilate on the utility of the teeth for effecting the trituration of food, for facilitating pronunciation and for maintaining the harmony established by Nature between all parts of the face. What we deem indispensable to call to mind, is the importance of the choice of the materials employed for the manufacturing of artificial teeth.

Hitherto, only animal materials have almost universally been employed for this purpose, such as ivory, the tibia and the teeth of the ox, the teeth of the hippopotamus and also human teeth.

But all these matters are more or less putrefiable. In consequence of their sojourn in the mouth they acquire a fetid odor, are altered, become rotten, communicate sometimes incurable diseases to the other teeth and injure generally the gums, making them spongy, giving them at last a most disagreeable scorbutic appearance. The saliva, impregnated with the deleterious sub-

stances coming from these sources of putrefaction, carries their malignant action into the stomach; the alimentary juices are vitiated, and consequently the whole economy partakes of this morbid state.

These disorders suggested about thirty years ago the idea of making incorruptible teeth of porcelain. Mr. Dubois de Chemant made them known to the Royal Academy of Sciences, who approved them in the sitting of June 10, 1789, upon the judgment of Messrs. Darcet and Sabatier.

But experience having not confirmed the judgment of this Society, porcelain teeth ought soon to be forgotten.

In fact, owing to the contraction that the kaolin undergoes in the baking, the dentures, either total or partial, made of only one piece of porcelain, though exactly moulded on the gums, no longer corresponded, after the baking, with the dimensions and the precise form of the jaw, or portion of jaw, for which they were intended.

The colors applied on these artificial pieces offered almost no variety. They but very imperfectly imitated Nature, and, being only fixed by the light fire of the muffle, were altered in very short time by the action of the saliva, of the gases issuing from the lungs and the stomach, etc.

The trials tending to compensate for the contraction of the porcelain with a proportional increase of the dimensions of the pieces were not

crowned with success. Besides, the porcelain teeth[1] have been used almost not at all; and this fact proves their great defects much better than all arguments that one could allege on this subject.

A dentist of Paris has recently tried a sandstone paste, susceptible of being filed and engraved after the baking; but the unpleasant color of this substance has prevented its use, so that this new production has been rejected.

Mr. Fonzi, successfully applying his knowledge to the improvement of the dental art, has been able to avoid the inconveniences which we have just mentioned, and by extremely ingenious processes (whose invention exclusively belongs to him) has succeeded in giving to the artificial teeth the highest degree of perfection.

To make his incorruptible teeth Fonzi mixes with different earths, in suitable proportions, different metallic oxides, all of them capable of resisting the strongest fire of the porcelain ovens. By this means he obtains pastes of all sorts of tints, from the most beautiful white to the color of decayed teeth; and modifies these tints by the application of enamels appropriate to each of them.

By means of moulds prepared with teeth of all

[1] Here are meant the teeth of porcelain properly so-called, having a composition incomparably simpler than that of Fonzi's terro-metallic teeth and of the mineral teeth used today, though even these are sometimes called, most improperly, porcelain teeth.

kinds and sizes he gives to the paste the different forms of the teeth themselves.

In the posterior part of each tooth a more or less deep groove is made in the vertical or the horizontal direction, the use of which will be spoken of further on. Across this groove a platinum cramp is driven into the paste of the tooth, so that the cramp forms with the groove a little hole or passage. The teeth so prepared are then submitted to the heat of a porcelain oven; and the contraction that the paste undergoes during the baking, fixes the platinum so firmly that it becomes quite impossible to remove it, unless the tooth be broken.

The paste itself acquires by the fire such a hardness that to break the tooth a force must be employed at least ten times greater than that which would be necessary to crush a porcelain tooth of the same size. This trial has been made by each one of us, and especially by Mr. Lenoir.

The wonderful variety of tints that Fonzi obtains by his vast manufacturing operations permits one to choose at once the color corresponding to that of the natural teeth of each person, while it would be almost impossible to get the right color if the teeth were manufactured for each single case.

The platinum cramps placed on the horizontal grooves serve to mount the teeth either for partial or for total dentures. To this end one passes a

platinum wire of sufficient thickness under the platinum cramps; then one solders them with gold, by means of the enameller's lamp. The prosthetic pieces mounted in this manner possess a solidity so much greater, as the wire is stronger, and the solder more abundant.

The teeth and the dentures tried by us could in no way be shaken whatever efforts we have made, even by means of a vise and a lever. With these two instruments one ultimately cracked the teeth, but did not separate the soldered pieces.

An extremely valuable advantage offered by Mr. Fonzi's method is this: If by an accident whatsoever a tooth must be changed the denture is not lost for this, as would be a denture made of one block of porcelain or any other substance. One immerses the prosthetic piece in the nitro-muriatic acid; this dissolves only the gold, namely, the solder, so that the teeth separate themselves. One withdraws them from the platinum wire in order to make the required changes, after which one has only again to make the mounting and soldering of the piece.[1]

When Mr. Fonzi wishes to make an entire or partial denture, in order to be sure that all the teeth of the same will have a good support point,

[1] In the above-mentioned operation, while the solder is dissolved, the platinum, being by far the more refractory, is not altered at all. The teeth themselves undergo no alteration whatever, however long they may be left in the acid.

and to establish an equal pressure on the part of the gums, he proceeds in the following manner: He takes the cast of the gums with wax; makes the counter-cast with plaster-of-Paris, thus obtaining the plaster model of the gums; with this model he makes a sand cast, destined to give, by pouring melted bronze in it, a metallic model, perfectly representing all elevations and depressions of the jaw. He then stamps on this bronze model a gold or platinum plate, which thereby takes the perfect form of the maxillary arch, and on which he fixes the teeth. By means of this metallic plate the artist can put the teeth on one level at their free end, choosing them, for this purpose, of a greater or less length, according to the more or less deep situation of the different support points; and when necessary he can also equalize the teeth by means of the lapidary wheel.

In order to prevent the gums from being too strongly compressed by the metallic plate, Mr. Fonzi covers with a rubber varnish the part of the plate which must be applied to the alveolar margin. This incorruptible varnish acts as a soft pad, and at the same time presents the advantage of lightly agglutinating the artificial piece to the gums.

The entire dentures are maintained and made to act by means of ordinary springs, the description of which we deem here quite useless.

Partial dentures and single teeth are fixed by

means of elastic springs peculiar to the author either to the contiguous teeth, if these be strong, or to the next ones, or even to distant teeth. These springs, far from weakening the neighboring teeth, support them, and oppose the falling of the unsteady ones. This process, entirely new and worthy the greatest eulogy, could not be as usefully employed for fixing artificial teeth made of animal substance.

Mr. Fonzi's method enables one to follow with such exactness all circumvolutions of the aveolar arches, to fix the prosthetic pieces so firmly, and to imitate Nature so well, that your Commissioners, in spite of the greatest attention, were not able to distinguish by sight several terro-metallic teeth that a man had been wearing for two years. And by this patient, as well as by several others wearing partial or total dentures, it was ascertained with experiments expressly accomplished that the prosthetic pieces could constantly bear all efforts of mastication without any derangement whatever. It was ascertained, besides, that the dentures had not undergone alterations of any kind in consequence of their long sojourn in the mouth.

The platinum cramps placed across the vertical grooves are destined to receive platinum pivots that Mr. Fonzi solders also with gold, and which serve in proper cases for the application of pivot teeth, after the processes known to all dentists.

It has been said, with reason, that pivot teeth

are not solid, and that they cause almost always an inflammation in the neighboring parts. But since pivots have been employed hitherto by dentists of all countries, we think it would be wrong to make Mr. Fonzi a particular reproof for the use of this method.

Besides, the above-mentioned platinum wires allow this skilful artist to do advantageously without the teeth with a vertical groove, and to find fastening points always equally strong wherever there are still natural teeth. We believe therefore that the only reason why he has shown us pivot teeth, has been to prove the superiority of his artificial teeth, since they, besides their incorruptibility, can be employed in all possible states of the dental system and after all processes hitherto in use.[1]

It remained to be examined whether Mr. Fonzi's incorruptible teeth preserved their gloss, color and solidity, after having been submitted to the action of an intense fire, of the vegetable and mineral acids, as well as of the gases habitually issuing from the stomach and lungs.

For this purpose a certain number of these teeth have been exposed to the fire of an enameller's lamp and heated to the white. After this they have invariably presented, without any

[1] While we were about to read before you this report, Mr. Fonzi has presented us new terro-metallic teeth with platinum cramps situated at the alveolar end, in a little vertical notch made for this purpose. These teeth unite to all the advantages of the first ones another most valuable advantage, viz, that of entirely hiding the mounting.

exception, all the qualities that we had previously recognized in them.

We have also exposed them during two days and a half to the uninterrupted action of the *acetic*, *citric*, *sulphuric*, *nitric*, *muriatic* and *nitro-muriatic acids*, as well as to that of *sulphuretted hydrogen* and of *carbonic acid*, these being, among all gases issuing from the stomach and lungs, the only ones that could be suspected to act upon Mr. Fonzi's terro-metallic teeth. But these have been withdrawn from all the above-mentioned reagents as glossy, as beautiful, as hard and all of them presenting quite the same tint as before.

The same teeth, submitted to the vapors of fluoric acid, have presented the decomposition that the vitrified bodies undergo by the action of this acid.

It results from all that has been said:

That the paste prepared by Mr. Fonzi differs from the porcelain paste, and that owing to the metallic oxides of which it is partly composed it acquires by the baking an incomparably greater hardness than kaolin does; which constitutes a true invention.

That the teeth made with this paste and enamelled after the author's process imitate Nature to the point of deceiving the most attentive eye.

That these teeth are altered neither by fire nor

by the gases and acids having no action upon vitrified substances.

That they are incorruptible and that a violent shock is required for breaking them.

That without the application of platinum it would be quite impossible to use advantageously either porcelain or the terro-metallic paste for the manufacturing of incorruptible teeth and dentures.

That the discovery of this application belongs to Mr. Fonzi.

That the metallic plate on which the incorruptible teeth are applied and which perfectly fits all sinuosities, elevations and depressions of the alveolar margin, renders it impossible that the teeth ever lose their level, and that the pressure be not equally produced on all points of this margin.

That the above said rubber layer hinders the gums from being too hardly pressed, and acts at the same time as a sort of incorruptible gluten that increases the adhesion of the artificial pieces to the gums.

That the manner of fastening these pieces facilitates their application and increases their solidity.

That they may be kept permanently in the mouth, may be cleaned like the natural teeth and can bear all efforts of mastication.

That, thanks to a manufacturing made on a vast scale, and to an indefinite number of tints,

Mr. Fonzi is able to apply at once every sort of teeth, and also to give the dentists the possibility of using no longer putrefiable substances for the dental prosthesis.

Finally, that Mr. Fonzi's processes deserve to be made universally known, as well from the point of view of health as for the sake of cleanliness, agreeableness, esthetics and economy.

Consequently your Commissioners come to the conclusion *that the present Report should be printed in the Collection of the Memoirs of the Athenæum of Arts; that it be read in the next public sitting, and that in this same sitting a Medal and a Crown (maximum rewards established by our regulations) be conferred on Mr. Fonzi.*

PARIS, March 1, 1808.

Signed, The Commissioners:

LENOIR, LUTON, GUIART FILS.

B. R. FABRÈ, Reporter.

Another most important document emanates from the Academy of Medicine of Paris. We give here its translation:

Report on the Artificial Terro-metallic Teeth of Mr. Fonzi, Surgeon-Dentist of the Faculty of Paris.

(Extracted from the Register of the Resolutions of the Academy of Medicine of Paris, Sitting of August 24, 1808.)

GENTLEMEN: Mr. Fonzi, Surgeon-Dentist, living in Paris, Place des Italiens No. 1, asked the Academy of Medicine of Paris about a month ago to name a Commission composed of Members of the same, in order to examine the means that he has invented and perfected, for repairing the loss of the natural teeth.

You have granted his request and named as Commissioners Messrs. Mallet, Descemet, Guillotin, Desessarts and myself. We now Gentlemen, report to you on Mr. Fonzi's works and their interesting features.

We must first of all inform you that this clever Dentist had already presented his works to the Athenæum of Arts, and that this learned Society, after an excellent and very instructive Report by our esteemed colleague, Dr. Fabrè, conferred on him a crown and a medal in their 80th public sitting. As the just-mentioned Report has been printed in the *Journal of Arts, Sciences, Literature and Politics*, we deem ourselves dispensed from entering here into numberless particulars which would only be a repetition of what everyone may read in that Report, that has also been printed separately, as an Abstract, from the above said journal, and can easily be got at the petitioner's.

We therefore will limit ourselves to establishing that Mr. Fonzi's terro-metallic teeth possess all desirable solidity, that they are incorruptible, and that the manner in which Mr. Fonzi fixes them is superior to every other heretofore known.

The artificial teeth invented by Mr. Fonzi are chiefly composed of an earth (the kaolin) and metallic oxides, a mixture that is susceptible by the action of fire of acquiring a hardness superior to that of porcelain. The variety of the oxides employed by Mr. Fonzi in his manufacturing gives to his artificial teeth an indefinite variety of tints, so that he is always able perfectly to match his artificial teeth with the natural ones that remain in the patient's mouth. We could ascertain this by about twelve persons who were presented to us, and in whose mouths the most attentive eye was able only with difficulty to distinguish the false teeth from the natural ones.

The mineral and vegetable acids, as well as the alkalis, in which the terro-metallic teeth were put for ten to twelve days did not alter at all their different hues, as we could ascertain beyond all possible doubt thanks to the precaution of immersing the teeth only by one half in the sulphuric, muriatic, nitric and citric acids, as well as in liquid ammonia and potash. The teeth, withdrawn from these different liquids, washed and dried, did not show any difference in their tints, not even under the microscope. We have also experimented upon the action of the same liquid, for the same period of time, on the fragments of terro-metallic teeth (the breaking of which, be it noted, is only possible by violent blows) and could not find, even in them, any sign of alteration.

From all these experiments it must be concluded that the terro-metallic teeth, besides possessing a very high degree of hardness and solidity, are incorruptible, and that neither the saliva nor the different kinds of food which they have to grind, nor the different gases which may issue from the stomach, are capable of altering their substance or their color.

Besides, since Mr. Fonzi mounts his terro-metallic teeth on platinum and makes the solderings with gold, it is clear that their mounting is also unattackable; from which it follows that his artificial teeth are preferable by reason of their incorruptibility, to all teeth made of ivory, bone, etc., for these, in time, constantly putrefy in the mouth of the wearer, thus becoming not only unfit to render any further service, but also injurious to health.

An advantage of great moment is also the manner in which Mr. Fonzi fixes in the mouth the prosthetic pieces of one or more teeth. It was hitherto usual to fix one or more artificial teeth carved on one single piece of osseous substance, by fastening them on each side to the next tooth with a gold wire or a waxed silk or hemp thread. This process has the deleterious effect of shaking little by little the two good teeth to which the false ones are tied and of provoking finally their falling out. Mr. Fonzi has found a manner of ingeniously fixing his partial prosthetic pieces by

means of a small elastic gold band, which, passing again and again between the teeth without fatiguing them, has mostly its support point on the more distant sound teeth, on which it does not exert any traction and which therefore are not shaken at all. This point is chiefly remarkable among the various improvements introduced in the dental art by Mr. Fonzi.

We will not discourse on the very ingenious manner used by Mr. Fonzi to construct partial or total dentures not injuring the gums of the patients, who, having lost many or the whole of their superior or inferior teeth, must have recourse to a prosthetic appliance. You can see in the printed Report that we have before mentioned how this clever Artist takes the exact form and figure of the jaw to be repaired, first in wax, then in plaster-of-Paris, obtaining finally a bronze model, and by means of this a stamped gold or platinum plate having the exact form of the alveolar arch, and on which he mounts one by one the terro-metallic teeth. Neither will we spend many words in speaking of his happy idea of covering the inner part of this metallic plate with several layers of a rubber solution, thus forming a sort of soft pad that makes the pressure of the prosthetic piece better tolerated by the gums. We will limit ourselves to telling you, Gentlemen, that in our opinion, the Academy can but applaud Mr. Fonzi's works, and should

give this most clever Dentist all marks of approbation that it is in its power to bestow.

Signed, Desessarts, Descemet, Guillotin, Mallet, Bourru.

Paris, August 15, 1808.

M. A. Petit, Secretary of the Academy.

These teeth combine the following advantages:

Incorruptibility. They are composed only of mineral substances.

Inalterability. The colors resist the action of the fire and of the most concentrated acids.

Solidity. They do not fracture under great stresses.

Variety. The colors infinitely multiplied correspond to the different colors of the natural teeth in relation to which the artificial teeth are to be placed.

Durability. They do not need to be renewed.

Facility. They can be mounted in every imaginable manner and with great promptitude by the special methods of their author.

The artificial teeth which are universally used in all nations do not possess these advantages. They are composed of animal substances, which discolor in the mouth, become decomposed and infected and in consequence it becomes necesary to frequently renew them.

MEDAL AND CROWN

awarded by

THE ATHENÆUM OF THE ARTS

IN A PUBLIC MEETING OF THE 15th OF MAY, 1818,

to

M. FONZI, SURGEON-DENTIST,

Rue Taitbout No. 12.

We must now speak of a vigorous and interesting debate that took place between Fonzi and a well-known dentist of that time, Dubois-Foucou: a debate which resulted in a complete victory for Fonzi.

Dubois-Foucou enjoyed a wide reputation in Paris; he belonged to several scientific societies; had been before the Revolution dentist to the King and royal family, and was, at the epoch of which we speak, Surgeon-Dentist to Napoleon I and the Empress, his consort. Among the French dentists of that time he was undoubtedly one of the first. But still greater than his reputation was his envy of the successes of others, and we have already seen that he had allied himself with the greater part of the dentists of Paris and with the chemist Duchateau, in bringing an action against Dubois de Chemant, which however ended in a great discomfiture for him and his associates.

Moved even by his rivalry with Dubois de Chemant, Dubois-Foucou had occupied himself

very much with the problem of mineral teeth, and after several years' labor he published, in 1808, a pamphlet with the title *Exposè de nouveaux procèdès pour la confection des dents dites de composition.*[1]

By this pamphlet he intended to elevate himself to the rank of a master in the new methods of prosthesis, and especially to oppose the increasing fame of *a stranger*, Fonzi, who already began to eclipse his fame.

But Fonzi had two great advantages over his envious rival which must insure his victory, viz, a profound scientific knowledge especially in respect to chemistry, and, what is still more, a genial and inventive mind.

Some weeks after the Athenæum of Arts had acknowledged Fonzi's great merits by conferring upon him a medal and a crown, Dubois-Foucou sent to the Athenæum his pamphlet on the "composition teeth," and asked likewise that a commission should be named for making a report on this work of his. The request was granted at once, but Fonzi published shortly after a writing by which Dubois-Foucou's pamphlet was almost deprived of all value. Then, seeing himself in a bad situation, Dubois-Foucou tried to impress in his favor both the public and the Athenæum itself, by publishing an open letter addressed to the French

[1] Exposition of New Processes for the Manufacturing of the So-called Composition Teeth.

dentists, in which he disapproved the judgment given by the Athenæum of Arts in regard to his rival, and strove to discredit Fonzi and his works with erroneous assertions and with expressions of contempt for that "*stranger*" who had the pretence to teach new things to the French dentists.

But this artful maneuver was not successful, for Fonzi defended himself vigorously, and on the other hand the Athenæum of Arts, not regarding at all the fact that one of the two adversaries was a stranger, judged with the absolute and serene impartiality that became such a learned and respectable Society.

Dubois-Foucou's pamphlet, though written in an authoritative tone, presented many weak points and furnished, in reality, evidence that the author in spite of all his efforts had only reached very poor results and little or nothing serviceable in practice. This fact, however, was skilfully dissembled, so that anyone not versed in these matters and not knowing in precise manner Fonzi's works and inventions, could have gathered from reading Dubois-Foucou's pamphlet the impression that the author had really brought most valuable contributions to the progress of the dental art, and that Fonzi, on the contrary, had done nothing particularly noteworthy.

To oppose the erroneous impression that Dubois-Foucou's pamphlet might have produced on the dentists, and on the public in general, Fonzi pub-

lished at once, as indicated above, a short reply intended to safeguard his rights, and in which he announced that he would publish in a short time a more complete and exhaustive reply.

In this second publication[1] Fonzi submitted Dubois-Foucou's pamphlet to an accurate and stringent critical examination, and confuted at the same time the false assertions and the errors contained in the above-mentioned open letter. He hastened, besides, as soon as he had published this reply, to send it to the Athenæum of Arts, in order to furnish this Society with all the elements necessary for the judgment that they had to give.

In Fonzi's reply there was a passage of particular interest, that we think it useful to reproduce here in its entirety.

"The manner in which M. Dubois-Foucou speaks of the means of applying the platinum to the mineral or composition teeth gives reason to think that he has not tried it, for, otherwise, the experience would have taught him the impracticability of the processes indicated by him. Should he persist in a contrary opinion, I am ready to prove to him my assertion by the facts, and challenge him to proceed with me to the experiments that shall give the proof of it. In his *Letter to*

[1] Réponse á M. Dubois-Foucou, chirurgien-dentiste, sur la Brochure publiée par lui en 1808, sous le titre *d'Exposè de nouveaux procédés pour la confection des dents dites de composition*, et sur sa Lettre addressé *à* Mrs. les Dentistes.

the Dentists he keeps silence on the application of platinum to the mineral teeth, which I had mentioned in my first reply to his pamphlet, as an invention that belongs to me *in an exclusive manner*. I believe him possessed of good faith enough not to raise any doubt about that; but should it be otherwise I can give the proofs of my assertion. In the year 6[1] I first substituted in dental prosthesis platinum for gold. Mr. Janety is the only artist that has perfected or, more precisely, has invented the method of reducing platinum into masses for use of the arts; he alone furnishes this article to the artists. He keeps an exact registration of the sales. One can therefore easily ascertain from him by how many years I have preceded the other dentists in the use of this metal applied to dental prosthesis. But I invoke also another testimony, namely, that of M. Dubois-Foucou himself, to whom I sold five ounces of ingot platinum, at the rate of 18 francs an ounce; he must remember that. I remember very well his telling me on that occasion that he had heard this metal spoken of, and was willing to make some trials for verifying the advantages of which I had spoken to him. I made in the year 1804 the application of this metal to the mineral teeth, incorporating it in the paste, and communicated this happy idea to

[1] Here is meant the year 6 of the Republican era, that is, the year 1797.

Dr. Swediaur. It is just at that epoch (as I said in my first reply and will now repeat) that I had my first pastes baked in Mr. Fourmi's oven. I availed myself successively of the ovens of Messrs. Dagoty, Neppel and Lefèvre. The workmen of all these ovens, who had worked in all porcelain manufactories of Paris, said that, though they had previously baked porcelain dentures, they had never seen mineral teeth like mine, especially as regards the metal that I incorporate in them and that does not melt at all. The manufacturers and directors of the same establishments made the same avowal; and finally the Members of the Institute of France, Messrs. Sabathier, Tenon and Gay-Lussac, named as commissioners for examining my teeth, have expressly declared what follows: *The chief peculiarity of Mr. Fonzi's mineral teeth is that he incorporates in them, before the baking, platinum cramps, by means of which he mounts them in all imaginable manners.* Since two years (*I said then, and must now say, since four*) I have been applying my mineral teeth to numberless persons; it would therefore be very astonishing for me that M. Dubois-Foucou should have no knowledge of the processes employed by me, so much the more as he has had at his service a workman named Shumaker, who had prevously worked with me. I may here repeat what I said then, namely, that M. Dubois-Foucou has no right to appropriate an invention which does not

belong to him, which the dental art owes to me, and without which the confection of mineral teeth could never have attained the degree of perfection to which I have brought it."

In regard to the processes employed by Dubois-Foucou for the confection of his mineral teeth, Fonzi skilfully enlarges upon all passages of his adversary's pamphlet, from which it can be gathered that Dubois-Foucou himself was not satisfied at all with the results obtained, for they left much to be desired. In that pamphlet there is among others a passage in which the author, little versed in chemistry as he himself avows, after speaking of the manifold phenomena that he observed by submitting to the action of fire the mineral mixtures on which he experimented, says that not being able to explain these phenomena he gives up the task to those consummate chemists who will be willing to occupy themselves therewith, and that it is just they who ought to establish the principles which shall guide the dentists in the manufacturing of mineral teeth, while he will limit himself to simply exposing the processes of which he has made use while waiting for better ones.

These last words evidently signify that Dubois-Foucou, in spite of all his efforts, had not been able to attain satisfactory results, as also appears from several other passages of his pamphlet.

Fonzi, however, did not limit himself in his

reply to put into evidence such partial avowals of his adversary, but invited all those who would take an interest in the question, to examine two prosthetic pieces (each of two teeth) manufactured by Dubois-Foucou, and that Fonzi had now in his possession. "It is a material proof," he writes at p. 25 of his reply, "that I offer to the observation of the curious. These pieces have a dull appearance, are porous and easily cut into by the file."[1]

Since the moment when Fonzi published his first reply, Dubois-Foucou clearly perceived his own inferiority in the face of his adversary. He then, as we have already mentioned, had recourse to a bold maneuver, namely, that of raising himself in his open letter against the judgment of the Athenæum of Arts, and of instigating with false assertions the French dentists against "*that stranger*," Fonzi, whom he qualified as an intriguer and a charlatan, not moved in the least by the sacred love of a noble art, but only by low commercial purposes. Seeing, however, very clearly that it

[1] Dubois-Foucou's complete failure in the manufacturing of mineral teeth is clearly mentioned in a pamphlet published at a much later epoch by Dr. J. Didier (*Mémoire sur de nouvelles dents et de nouveaux dentiers en pâte minéro-admantine*, Paris, 1846). At p. 5 of this pamphlet Didier writes that Dubois-Foucou was still less successful than his predecessor Dubois de Chemant in the manufacturing of mineral teeth, and that after numberless trials and immense labor, he was at last obliged to give up his undertaking. Didier says in the same page that Fonzi can with good right be considered as the inventor of the mineral teeth now in use.

would have been impossible for him to continue the contest with honor, he resorted to the weak device of declaring that he intended abstaining from any further discussion. He therefore ended his letter by addressing the French dentists with these words: "*You, Gentlemen, will easily destroy such an ephemeral and unmerited triumph. As for me, I think that I have sufficiently accomplished the task that I have undertaken, and I declare to you that I abandon for ever the arena, leaving to you the care of reëstablishing the honor of our art and that of the French dentists.*"

This was undoubtedly a very impotent method of issuing, with an appearance of dignity, from the false position into which he had put himself. But Fonzi, though constantly keeping in his reply a perfect calm and serenity in spite of the offensive language of his adversary, did not omit putting in full evidence the strange behavior of Dubois-Foucou, who, after having violently attacked him, declared his firm intention of abandoning the contest, leaving to others the care of continuing it. "Who," exclaims Fonzi, "would ever have expected such a conclusion! Why sharpen the arms with such great ardor, only to put them down or remit them to others? Does not M. Dubois-Foucou resemble a warrior who leads and incites to the combat a squad of soldiers, but abandons them just at the moment when the firing is about to begin?"

As for the Athenæum of Arts, Dubois-Foucou tried in vain, when he saw himself in a bad situation, to prevent that Society from pronouncing their authoritative judgment.

The Athenæum, complying with the request made by Dubois-Foucou in sending his pamphlet, had named as commissioners for examining it Messrs. Le Blond, De Trouville, De Saintot and Jacquelin-Dubuisson. But the contest that arose soon after between Dubois-Foucou and Fonzi rendered it necessary for the Commission to enlarge their task, namely, to examine in a parallel manner the writings and works of the two competitors in order to issue afterward a comprehensive and well-founded judgment.

The report that the above-named commissioners presented to the Athenæum was read and approved in the general assembly of November 13, 1809. We give here the most important parts thereof:

"M. Dubois-Foucou's pamphlet might at first disquiet the Athenæum in regard to the vote of approbation granted to M. Fonzi, for the author of that pamphlet showed the pretence of having made as much as M. Fonzi and, besides, prior to him.

"The Athenæum of Arts has no other aim than justice and truth; and even in the case of the slightest uncertainty, desired that its judgment should be fortified by the results of the most

accurate research on the merits and talents of the two artists.

"Your commissioners had already undertaken the examination of M. Dubois-Foucou's pamphlet, when he sent to the Athenæum another writing, entitled, *A Letter to the Dentists.*

"M. Dubois-Foucou was free to attack as he liked the principles and practice of an artist, against whom his letter was directed, but one cannot but wonder at his drawing into the scene the Athenæum of Arts, for in all that had fixed your attention concerning the inventions and discoveries that you approved of, M. Dubois-Foucou was noways in question. Notwithstanding, he sends you this writing, in order that you may read in it, at p. 3, that *he sees that the Athenæum, though showing its zeal for the progress of Arts, tends to retard that of one of them that is very useful to Humanity.*

"However great be the confidence due in justice to the Commissioners upon whose conclusions you have crowned M. Fonzi, the decided tone and assertions of M. Dubois-Foucou have caused us to redouble our attention. We have thought it our duty to use the utmost scrupulousness in our examination, to compare with the greatest accuracy the processes of both artists, and to ascertain by the comparison of their works, the rights that they may have to your suffrage, and the degree of confidence that the

public may grant to their inventions, discoveries and methods.

"We were about to give you an account of our work, when M. Fonzi sent to the Athenæum a writing with the title: *A Reply to M. Dubois-Foucou, Surgeon-Dentist, on the pamphlet published by him in 1808 under the title of Exposition of New Processes for the Manufacturing of the So-called Composition Teeth and on his Letter to the Dentists.*

"This writing of M. Fonzi has seemed to us worthy of the greatest attention. It answers all of M. Dubois-Foucou's assertions. The author follows him step by step and thoroughly treats the parts of dental art that have made and ensured his reputation. He enlightens the dentists and gives them the most complete demonstration of the errors, both theoretical and practical, contained in M. Dubois-Foucou's pamphlet and in his *Letter to the Dentists.* It is, in short, a reasoned analysis in which the public itself, that is, always the most interested in these discussions will find sufficient motives for welcoming discoveries that are essentially destined to its advantage. As for the dentists, they will gather from this writing that it is important to them not to admit errors and assertions which could only mislead them.

"Your Commissioners adopt, Gentlemen, M. Fonzi's reply in what concerns his critical examination of M. Dubois-Foucou's pamphlet; their con-

viction joins his own in regard to the errors that he puts into evidence.

"As for the comparison that we had to make between the processes of the two artists, we have thought it necessary, in order to know the truth, to betake ourselves successively to the one and the other

"M. Dubois-Foucou presented us different pieces of his composition. The examination that we have made of them has fully convinced us of what he himself avows in his two writings, namely, that he could not succeed in manufacturing composition teeth capable of properly substituting the natural ones. The surface of his mineral teeth has a dull appearance, is rough and their substance is easily cut into by a file. As to the color, we have attentively observed that it does not imitate at all that of the natural teeth; and the manner in which M. Dubois-Foucou pretends to mount his pieces has seemed to us impracticable.

"But in order to have on this point all the elements necessary for establishing a sure judgment, we requested M. Dubois-Foucou to let us see some of his prosthetic pieces in the mouths of the patients for whom they had been made. To this he gave an absolute denial, under the pretext that he could, with no exception at all, not allow himself to violate the secrets of those who gave him their confidence.

"This refusal of M. Dubois-Foucou's by which

a parallel with M. Fonzi's prosthetic works was rendered impossible has seemed to us not to be in agreement with the superiority that he pretends.

"We then betook ourselves to M. Fonzi's. The people whom he had asked to come to him for this purpose had hastened to give him this proof of their satisfaction. We could observe in their mouths partial or total dentures, made by M. Fonzi; and these people attested to us unanimously the excellence of those appliances, which rendered them possible to pronounce the words in a perfect manner, to enjoy all the advantages of a good mastication, and to be free from the inconveniencies due to the putrescence of the teeth made with animal substances.

"Our examination has not been limited to observing the prosthetic pieces in the mouths of their wearers: each of these latter has allowed his prosthesis to be removed and replaced. Thus we could see that this operation, or, rather, this most simple act, was carried out with the greatest facility, which is a further proof of the excellence of the processes used by the author for mounting his prosthetic pieces and for varying them in accordance with the different cases presented by the losses to be repaired. We have attentively examined all parts constituting these pieces, as we had observed the facility and precision of their movements. And, as a result of our examination, we attest before you that we

have found in M. Fonzi's works all the qualities that our colleagues, your first Commissioners, have affirmed in their Report of March 14, 1808: *Incorruptibility, perfect imitation of Nature as to color and form, solidity, etc.* We have also admired the great skill with which M. Fonzi can vary the construction of his prosthetic pieces and the manner of fixing them, thus overcoming the difficulties that the different cases may present.

"Some time after the examination that we had made at M. Fonzi's, M. Dubois-Foucou addressed a letter to the Athenæum, in which he declared that he no longer wished any Report. This letter could not fail to give place to obvious reflexions on the behavior of its author.

"After having written that *the Athenæum, though showing its zeal for the progress of Arts, tends to retard that of one of them that is very useful to Humanity;* after having made this accusation public; after having acquired the certainty that M. Fonzi's superiority was acknowledged, and that the result of any comparison could not be favorable to him, M. Dubois-Foucou allows himself to inform you by a letter that he no longer wishes any Report! This manner of imposing silence upon a Society that knows its duties may suit the aims of M. Dubois-Foucou, but the Athenæum cannot admit it and be silent, especially when justice and truth command them to give their Reports the greatest publicity, in accord-

ance with a superior interest, that, namely, of the progress and perfection of a useful art that must henceforth be freed from an ancient routine prejudicial to health.

"The Athenæum will always do justice to the artists, when they, encouraged by the example of their predecessors, have succeeded in realizing a new progress, but will never consider the ill humor of those whose pretences cannot be admitted.

"This Report, Gentlemen, would be incomplete, should we not add what follows. M. Dubois-Foucou has affirmed to us that the oxides of iron and manganese are the only ones that are employed by him and his confreres in the composition of their artificial teeth. This assertion gives room for an important remark. If M. Dubois-Foucou has had good reasons for affirming that his colleagues, like himself, use no other oxides than those of iron and manganese in the composition of their teeth, his assertion cannot at all be applied to the artificial teeth of M. Fonzi, the composition of which is quite different and, besides, varied in numerous manners, by which he is able to imitate all the different tints and hues of the natural teeth.[1]

[1] See in the appendix (122 et seq.) the long series of formulas relating to the composition of the pastes and enamels used by Fonzi in the manufacturing of his mineral teeth. He had communicated his manufacturing processes, under the bond of secrecy, to the Athenæum of Arts.

"Encouraged by your suffrage and by the confidence of the public, M. Fonzi has made, after the Report of our colleagues, new and successful efforts, for more and more improving his methods. He has by far surpassed today the merits until then acquired; and his new successes are a warrant for those that he desires and will be able to obtain.

"For the motives exposed in this Report, your Commissioners are of the opinion that the Athenæum of Arts should not give its approbation to M. Dubois-Foucou's pamphlet having the title: *Exposition of New Processes for the Manufacturing of the So-called Composition Teeth;* and that the Athenæum should, on the contrary, attribute new praises to M. Fonzi for his having brought the manufacturing of his artificial teeth to the highest degree of perfection hitherto known."

After this verdict of the Athenæum of Arts, Dubois-Foucou kept an absolute silence and made no further attempt to oppose his rival's victory. He understood too well that any reaction whatever on his part would only attract more and more the attention of the public and of all competent persons to Fonzi's great merits and his own inferiority to him.

FONZI'S SCIENTIFIC WRITINGS

We have repeatedly mentioned Fonzi's learned and exhaustive *Reply* to his rival Dubois-Foucou.

This polemical writing, though a small volume (52 pages in 8°), is of the highest importance in relation to the history of the invention of mineral teeth. At the same time it shows Fonzi's solid instruction in all branches of science related to his invention.

Fonzi's activity for the greater part of his life was almost entirely absorbed by his professional work and by the studies and researches that rendered possible his inventions and their gradual improvement. His continual travels must also have taken much of his time, especially in an epoch when rapid means of locomotion were not yet in existence. For all these reasons it was only in late years that Fonzi found it possible to dedicate himself to the composition of literary or scientific works. His marked tendency to poetry then prevailed, and he wrote in that period of his life all the poems and tragedies which we have referred to elsewhere.

His scientific writings are less numerous. The most important of them (apart from his *Reply* to Dubois-Foucou) is a *Treatise on Odontology*, in French. It is to be lamented, however, that Fonzi, owing perhaps to the long and serious disease that afflicted his last years, could not complete and publish this work. Its manuscript is composed of 228 pages of large size and very small writing. All subjects are developed with great accuracy and generally much better than

they were treated in contemporaneous dental books. But the chief importance of this work consists in the fact that it contains the description of the processes followed by Fonzi in the manufacturing of his mineral teeth, and in the construction and application of the total or partial dentures made with them.

With this part of his book, Fonzi accomplished an obligation that he had undertaken many years before, by writing in his *Reply* to Dubois-Foucou the following words: "Persuaded as I am that the social man should apply to the benefit of society what he has been able to contrive for the utility of its members, I shall not leave my professional career without publishing all that I have invented, in order that both the public and the dentists may derive from my processes the advantage that I have endeavored to procure to my contemporaries."

Among Fonzi's writings must also be mentioned a rich collection of dental and medical receipts, a collection of articles, notices and remarks concerning the cholera epidemic of 1832, and the Italian translation of an important *Report* presented in June, 1831, to the Royal Academy of Medicine of Paris by a Commission of the same Academy, upon a series of experiments relating to animal magnetism.

Though these last works, in comparison with Fonzi's original writings, are of almost no import-

ance, they serve, however, to illustrate how various and extensive was the field of action of his genial mind.

Fonzi's great merits were recognized by numerous scientific associations of his time, that desired to have him as a member and a collaborator. He was not only nominated as a member of the Athenæum of Arts in Paris, as has already been mentioned, but he also became an associate of the Academy of Science and of the Society of Medicine of that city. The Imperial Academy of Medicine of Petersburg named him as a member and he was also a member of the Royal Economical Society of Madrid, a corresponding member of the Accademia Pontaniana of Naples and of the great Economic Society of Petersburg. The medals and certificates of merit which Fonzi received, we refrain from mentioning as of minor importance. We will only note that the Government of Napoleon I conferred on Fonzi in recognition of the usefulness of his inventions, a medal of merit, bearing the effigy of the Emperor.

APPENDIX.

I.

Composition of the pastes and enamels used by Fonzi for the manufacturing of his mineral teeth. The formulas are given in a series by order of tints, from the lightest to the darkest.

Paste No. 1.

Kaolin, 6 ounces.
Earth of Vanvres, 1 ounce, 4 drams.
Oxide of titanium, $\frac{1}{2}$ dram, 4 grains.
Oxide of gold, $\frac{1}{8}$ grain exactly.
Filings of platina, 2 grains.

Enamel No. 1.

Petunzee, 7 ounces.
Kaolin, 3 drams.
Oxide of titanium, $\frac{1}{2}$ dram, 4 grains.
Oxide of gold, $\frac{1}{8}$ grain exactly.

Paste No. 2.

Kaolin, 6 ounces.
Earth of Vanvres, 1 ounce, 4 drams.
Oxide of titanium, $\frac{1}{2}$ dram, 14 grains.
Oxide of gold, $\frac{1}{8}$ grain, (good weight.)
Filings of platina, 2 grains.

Enamel No. 2.

Petunzee, 7 ounces.
Kaolin, 3 drams.
Oxide of titanium, ½ dram, 24 grains.
Oxide of gold, ⅛ grain, (good weight.)

Paste No. 3.

Kaolin, 6 ounces.
Earth of Vanvres, 1 ounce, 4 drams.
Oxide of titanium, ½ dram, 24 grains.
Oxide of gold, ¼ grain.
Filings of platina, 2 grains.

Enamel No. 3.

Petunzee, 7 ounces.
Kaolin, 3 drams.
Oxide of titanium, ½ dram, 24 grains.
Oxide of gold, ¼ grain.

Paste No. 4.

Kaolin, 6 ounces.
Earth of Vanvres, 1 ounce, 4 drams.
Oxide of titanium, ½ dram, 34 grains.
Oxide of gold, ¼ grain.
Filing of platina, 2 grains.

Enamel No. 4.

Petunzee, 7 ounces.
Kaolin, 3 drams.
Oxide of titanium, ½ dram, 34 grains.
Oxide of gold, ¼ grain.

Paste No. 5.

Kaolin, 4 ounces.
Earth of Vanvres, 4 drams.
Oxide of titanium, ½ dram, 26 grains.
Oxide of zinc, 32 grains.
Oxide of gold, ¼ grain.
Filings of platina, 1 grain.

Enamel No. 5

Petunzee, 4 ounces, 2 drams.
Kaolin, 1½ drams.
Oxide of titanium, ½ dram, 26 grains.
Oxide of zinc, 32 grains.
Oxide of gold, ¼ grain.

Paste No. 6.

Kaolin, 4 ounces.
Earth of Vanvres, 4 drams.
Oxide of titanium, ½ dram, 26 grains.
Oxide of zinc, 32 grains.
Filings of platina, 1 grain.

Enamel No. 6.

Petunzee, 4 ounces, 2 drams.
Kaolin, 1½ drams.
Oxide of titanium, ½ dram, 26 grains.
Oxide of zinc, 32 grains.

Paste No. 7.

Kaolin, 4 ounces.
Earth of Vanvres, 4 drams.
Oxide of titanium, ½ dram, 26 grains.
Oxide of uranium, 10 grains.
Oxide of gold, ¼ grain.
Filings of platina, 1 grain.

Enamel No. 7.

Petunzee, 4 ounces, 2 drams.
Kaolin, 1½ drams.
Oxide of titanium, ½ dram, 26 grains.
Oxide of uranium, 10 grains.
Oxide of gold, ¼ grain.

Paste No. 8.

Kaolin, 4 ounces.
Earth of Vanvres, 4 drams.
Oxide of titanium, 1 dram.
Oxide of zinc, ½ dram, 4 grains.
Oxide of gold, ¼ grain.
Filings of platina, 1 grain.

Enamel No. 8.

Petunzee, 4 ounces, 2 grains.
Kaolin, 1½ drams.
Oxide of zinc, ½ dram, 4 grains.
Oxide of gold, ¼ grain.

Paste No. 9.

Kaolin, 1 ounce, 4 drams.
Earth of Vanvres, 2 drams.
Oxide of titanium, ½ dram.
Filings of fine gold, 2 grains.
Filings of platina, 2 grains.

Enamel No. 9.

Petunzee, 2 ounces.
Kaolin, 24 grains.
Oxide of titanium, 16 grains.
Filings of fine gold, 2 grains.

Paste No. 10.

Kaolin, 6 ounces.
Earth of Vanvres, 1 ounce, 4 drams.
Oxide of titanium, 2 drams, 16 ounces.
Oxide of gold, $\frac{1}{4}$ grain.
Filings of platina, 2 grains.
(This paste is used with the enamels Nos. 10, 11 and 12.)

Enamel No. 10.

Petunzee, 7 ounces.
Kaolin, 3 drams.
Oxide of titanium, 2 drams, 16 grains.
Oxide of gold, $\frac{1}{4}$ grain.

Enamel No. 11.

Petunzee, 7 ounces.
Kaolin, 3 drams.
Oxide of titanium, 2 drams, 16 grains.
Oxide of gold, $\frac{1}{4}$ grain, (good weight.)

Enamel No. 12.

Petunzee, 7 ounces.
Kaolin, $1\frac{1}{2}$ drams.
Earth of Vanvres, $1\frac{1}{2}$ drams.
Oxide of titanium, 2 drams, 16 grains.
Oxide of gold, $\frac{1}{4}$ grain, (good weight.)

Paste No. 13.

Kaolin, 6 ounces.
Earth of Vanvres, 1 ounce, 4 drams.
Oxide of titanium, 2 drams, 26 grains.
Oxide of gold, $\frac{1}{4}$ grain, (good weight.)
Filings of platina, 2 grains.

Enamel No. 13.

Petunzee, 7 ounces.
Kaolin, 3 drams.
Oxide of titanium, 2 drams, 26 grains.
Oxide of gold, $\frac{1}{4}$ grain, (good weight.)

Paste No. 14.

Kaolin, 6 ounces.
Earth of Vanvres, 1 ounce, 4 drams.
Oxide of titanium, $2\frac{1}{2}$ drams.
Oxide of gold, $\frac{1}{4}$ grain, (good weight.)
Filings of platina, 2 grains.
(This paste is used with the enamels Nos. 14, 15 and 16.)

Enamel No. 14.

Petunzee, 7 ounces.
Kaolin, 3 drams.
Oxide of titanium, $2\frac{1}{2}$ drams.
Oxide of gold, $\frac{1}{4}$ grain, (good weight.)

Enamel No. 15.

Petunzee, 7 ounces.
Kaolin, $1\frac{1}{2}$ drams.
Earth of Vanvres, $1\frac{1}{2}$ drams.
Oxide of titanium, $2\frac{1}{2}$ drams.
Oxide of gold, $\frac{1}{4}$ grain, (good weight.)

Enamel No. 16.

Petunzee, 7 ounces.
Kaolin, 3 drams.
Oxide of titanium, $2\frac{1}{2}$ drams.
Oxide of gold, $\frac{1}{2}$ grain, (good weight.)

Paste No. 17.

Kaolin, 3 ounces.
Earth of Vanvres, 5 drams.
Oxide of manganese, 25 grains.
Oxide of titanium, 25 grains.
Oxide of gold, $\frac{1}{4}$ grain exactly.
Filings of platina, $1\frac{1}{2}$ grains.

(This paste is used with the enamels Nos. 17 and 18.)

Enamel No. 17.

Petunzee, 4 ounces.
Kaolin, 1 dram.
Oxide of manganese, 25 grains.
Oxide of titanium, 25 grains.
Oxide of gold, $\frac{1}{4}$ grain exactly.

Enamel No. 18.

Petunzee, 4 ounces.
Kaolin, 1 dram.
Oxide of manganese, 34 grains.
Oxide of titanium, 34 grains.
Oxide of gold, $\frac{1}{4}$ grain exactly.

Paste No. 19.

Kaolin, 1 ounce, 4 drams.
Earth of Vanvres, 2 drams.
Oxide of titanium, $\frac{1}{2}$ dram, 9 grains.
Filing of fine gold, $2\frac{1}{2}$ grains.
Filings of platina, 3 grains.

Enamel No. 19.

Petunzee, 2 ounces.
Kaolin, 24 grains.
Oxide of titanium, $\frac{1}{2}$ dram, 9 grains.
Filings of fine gold, $2\frac{1}{2}$ grains.

Paste No. 20.

Kaolin, 6 ounces.
Earth of Vanvres, 1 ounce, 4 drams.
Oxide of titanium, 2½ drams, 20 grains.
Oxide of gold, ½ grain exactly.
Filings of platina, 2 grains.
(This paste is used with the enamels Nos. 20 and 21.)

Enamel No. 20.

Petunzee, 7 ounces.
Kaolin, 1½ drams.
Earth of Vanvres, 1½ drams.
Oxide of titanium, 3 drams.
Oxide of gold, ½ grain, (good weight.)

Enamel No. 21.

Petunzee, 7 ounces.
Kaolin, 3 drams.
Oxide of titanium, 2½ drams, 20 grains.
Oxide of gold, ½ grain exactly.

Paste No. 22.

Kaolin, 1 ounce, 4 drams.
Earth of Vanvres, 2 drams.
Oxide of titanium, ½ dram, 19 grains.
Filings of fine gold, 3 grains.
Filings of platina, 2½ grains.

Enamel No. 22.

Petunzee, 2 ounces.
Kaolin, 24 grains.
Oxide of titanium, 35 grains.
Filings of fine gold, 3 grains.

Paste No. 23.

Kaolin, 6 ounces.
Earth of Vanvres, 1 ounce, 4 drams.
Oxide of titanium, 3 drams.
Oxide of gold, $\frac{1}{4}$ grain, (good weight.)
Filings of platina, 2 grains.

Enamel No. 23.

Petunzee, 7 ounces.
Kaolin, 3 drams.
Oxide of titanium, 3 drams.
Oxide of gold, $\frac{1}{4}$ grain, (good weight.)

Paste No. 24.

Kaolin, 3 ounces.
Earth of Vanvres, 6 drams.
Oxide of titanium, $1\frac{1}{2}$ drams.
Oxide of gold, $\frac{1}{2}$ grain exactly.
Filings of platina, 1 grain.

Enamel No. 24.

Petunzee, 4 ounces, 2 drams.
Kaolin, $1\frac{1}{2}$ drams.
Oxide of titanium, $1\frac{1}{2}$ drams, 10 grains.
Oxide of gold, $\frac{3}{4}$ grain exactly.

Paste No. 25.

Kaolin, 8 ounces.
Earth of Vanvres, 1 ounce, 4 drams.
Oxide of titanium, 2 drams, 12 grains.
Ammonio-muriate of platina, $\frac{1}{2}$ grain exactly.
Oxide of gold, $\frac{1}{4}$ grain, (good weight.)
(This paste is used with the enamels Nos. 25 and 26.)

Enamel No. 25.

Petunzee, 8 ounces, 4 drams.
Kaolin, 4 drams.
Oxide of titanium, 2 drams, 12 grains.
Ammonio-muriate of platina, $\frac{1}{4}$ grain exactly.
Oxide of gold, $\frac{1}{4}$ grain.

Enamel No. 26.

Petunzee, 8 ounces, 4 drams.
Kaolin, 4 ounces.
Ammonio-muriate of platina, $\frac{1}{4}$ grain.
Oxide of titanium, $2\frac{1}{2}$ drams.
Oxide of gold, $\frac{1}{2}$ grain.

II.

Biographical Notes on Antonio Rotondo, A Disciple of Fonzi.

Antonio Rotondo was one of the most illustrious Spanish dentists of the Nineteenth Century.

He was born in Madrid in the year 1808. His father, Dentist in Ordinary to the Royal Court in the times of Charles IV and Ferdinand VII, enjoyed a very good situation, and as he wished that his son Antonio might be his successor in the place of dentist to the Court he procured for him a very accurate education also in literary matters, and at the same time initiated him very early in the exercise of the dental art.

In 1824 it happened that Ferdinand VII, suffering from a severe attack of toothache, sent for his dentist.

But he, being confined to his bed by a disease that a short time afterward put an end to his life, sent to the King, in his stead, his young son Antonio, who was then hardly sixteen years old. King Ferdinand was highly satisfied with the appearance, the manners and the skill of this very young dentist, and from that moment resolved to have him continue his professional studies in the best possible manner, not only in Spain, but also abroad, allowing him a pension for this purpose.

Some time afterward Ferdinand VII, requiring the services of a dentist of peculiar ability, called Fonzi to Madrid for the third time, and on this occasion he intrusted young Antonio Rotondo to him, in order that the latter might under his direction learn as perfectly as possible all parts of the dental art and science.

Antonio Rotondo remained with his illustrious master for several years, accompanying him in his frequent travels. He obtained in Paris by examination the diploma of surgeon-dentist, and on his return to Madrid was promptly appointed as a dentist to the Royal Family, a situation which he kept almost until the end of his life.

But Antonio Rotondo was not simply an eminent dentist; he also distinguished himself as a literary man, as a musician and painter.

Among his scientific writings, we deem worthy of special mention *A Treatise on the Extraction of Teeth, Instructions on the First and Second Dentition* and *A Treatise on Dental Hygiene;* but the best of all are undoubtedly his capital *Lessons on Dental Surgery*, published in Madrid, 1877, a short time before his death.

In the introduction to one of his books (*Instrucciones sobre la primera y segunda denticion y tratado de higiene dentaria*, Madrid, 1840) Rotondo mentions his master Giuseppangelo Fonzi, saying that "His admirable discoveries produced a complete revolution in dental art."[1]

We have a clear proof of Antonio Rotondo's vast and varied knowledge in his literary writings and his translations. He published, besides minor historical works, the *History of the Escurial*, a splendid, richly illustrated book, that cost him great labors and enormous expenditure. Among his translations may be mentioned: *Gall's Phrenology*, *The System of Lavater*, *Silvio Pellico's Memoires* and *Muller's History of Greek Literature*. Rotondo was also the author of a French and Spanish *Dictionary*. His literary activity only finished with his life. At seventy-one years of age he had just begun to write *A Comparative History of Religions*, when death suddenly put an end to his noble existence.

Antonio Rotondo was Dean of the Dental Faculty of Madrid, First Surgeon-Dentist to His Majesty the King of Spain, Surgeon-Dentist to the Spanish Army and to the Military Hospitals of Madrid, Founder-member of the Surgical Academy of Madrid, Knight of the Order of Charles III, of the Golden Sword and many other orders, Member of the Medico-Philanthropic and Phrenological Society of Paris, of the Spanish Anatomical Society and of other scientific artistic and literary associations.

[1] . . . mi buen maestro don Jose' Angel Fonzi, cuyos admirables descubrimientos causaron una revolucion total en el arte.

III.

Translation of the French Letter on Page 25.

Paris, 22 December, 1811.

My dear, dear Orante:

Will you and are you able to excuse my long silence? If you were nearer to me I would make you understand the feelings of my heart; you would judge it, and your spirit, especially your goodness, would help me to throw off a feeling that oppresses this heart, which is devoted to your family. It is quite true, dear Orante, that the years pass and are unlike the preceding ones. It is a year ago that I began to devote my whole being to this friendship, to this love, love of the soul, which purifies and ennobles all actions of life, which creates in the heart all good intentions. This year, what a difference, dear Orante! It is necessary always and for ever to give up sweet illusions. Ah! vain and chimerical projects of man, what becomes of you in front of the inevitable laws of destiny! A year ago I became ill with disease of the chest, which has destroyed for ever all my dreams of happiness. I see with anguish what I must lose, and I cannot face without terror what I know I must give up. No, no, dear Orante, there is no philosophy which is able to give us the power to face the unknown without fear. We have in the past centuries examples of heroism; but the past is far from us, and I who am of the present, I feel only too well that I have not the indomitable courage of those men, and a dark melancholy is nearly always the result of the reflections which take possession of me and increase my misery. I need not give you long details of this terrible disease, you know

them, as poor Settimio died of it. Unfortunately there has not been found an antidote for that poison. As I am of a gay disposition, that consoles me a little, but not enough for the misery that I must face. It is with difficulty that one becomes accustomed to suffering, one ends however by bearing it patiently, but one never becomes accustomed to see death approaching. What my heart suffers is at least as dangerous as the other disease; it is extremely sensitive, and that neither lessens nor calms my trouble. I try every possible means of hardening my heart, but what Nature has made, she has well made. I need to amuse myself, to forget my situation, and that is what I do as far as possible: the devil only knows; but in spite of my efforts to be reasonable, there are no words in any language which will express what I feel and what I suffer: and what language could express such suffering?

I have lost all hope, in my present situation, of one day embracing you, and of telling you with my own voice that I love you and everything that belongs to the family of my dear Fonzi. He had so accustomed me to think of his family as mine, that I made continual vows to go to Orsogna; but even this hope is lost. In my dear Peppangiolo, for the last four years, dear Orante, I have seen my whole existence: perhaps it is an idolization on my part, but I find in him my god, and the god of Hélène is one of truth. My wishes for happiness are entirely in him and I hope for nothing more. My eyes which are the slaves of my heart, are filled with tears; happy those, who can still shed them!

Remember me, dear Orante, and know that you will always remain in the heart of Hélène. My husband ought to write you, but he is so busy, and

my illness has grieved him so much, that you will understand that with his natural laziness for writing letters, he deserves to be excused by his brother.

If the most ardent prayers of my heart might be heard, then everyone who bears the name of Fonzi would have perfect happiness. These are the sentiments of Hélène, and you see her heart uncovered: she whom you have named your dear sister, your Hélène, could she ever have others, dear Orante? Keep for me these sweet and flattering names, and renew my assurance by replying quickly: I expect this from your friendship.

I send you kisses and remain your sister and friend for this life and the next.

HÉLÈNE DE CLECY,
Wife of Fonzi.

IV.

IMITATION OF CARIOUS TEETH.

As most people were formerly ashamed to wear artificial teeth and wished to keep the fact a most rigorous secret, Fonzi made mineral teeth wonderfully imitating the approximal caries of the front teeth. In certain cases, and especially when a front tooth was to be substituted in the mouth of a high personage, he made, before extracting the carious tooth, an artificial one that perfectly imitated it, and applied it as soon as possible. Among Fonzi's teeth I have found two incisors with a perfect imitation of an approximal caries. Unfortunately, the more beautiful of the two has been stolen from me, together with a great number of other Fonzi's teeth. But I keep the other and have had it photographed.

V. G.

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